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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemists Going into Industry

ATTENTION has more than once been drawn to the tendency among distinguished chemists to look for their rewards in industrial fields rather than in academic and research work, and to the migration of scientists in Government service towards private appointments. Perhaps the best known among recent cases is that of Dr. Stratton, who recently vacated the directorship of the U.S.A. Bureau of Standards for the principalship of the "Boston Tech.," frankly on account, to a large degree, of the increased emoluments. To this has now been added a series of similar changes. First among these is the resignation, as from June 1, of Dr. Richard B. Moore, chief chemist of the U.S.A. Bureau of Mines, in order to undertake commercial work with the Dorr Company, chemical engineers, of New York, followed by the appointment of Dr. S. C. Lind as his successor. Dr. Moore has held the appointment since 1912. Previous to his Governmental service he was closely associated with Sir William Ramsay in research work on the rare gases. In 1911 he was appointed assistant chief of the division of chemical and physical investigators in the Bureau of Soils, Department of Agriculture. While in the Bureau of Soils he became much interested in the possibilities of the development of the radio-active ores of South-Western Colorado and Eastern Utah, and this led to his transfer in 1912 to the Bureau of Mines and to his being detailed to establish a rare metals experiment station of the Bureau in Denver. Dr. Moore initiated the Bureau's programme for the production of radium in the United States from the Colorado and Utah ores, which were being shipped to Europe and concentrated there. By the application of processes developed by him, radium having a market value of nearly one million dollars was produced through a co-operative agreement between the Department of the Interior and the National Radium Institute. Dr. Moore was largely instrumental in bringing to the attention of American medical men the value of radium in cancer treatment, and in encouraging the use of mesothorium as a substitute for the more valuable radium in the manufacture of luminous paint. The widest recognition has been accorded Dr. Moore on account of his investigative work on radio-activity and the chemical separation of radio-active types of matter, on the atomic weights of krypton and xenon, the metallurgy of rare metals, and the liquefaction of gases. Of recent years he has directed the research work of the Bureau of Mines in the practical recovery of helium from natural gas, and it is largely through his work in the Bureau that the cost of this element has been reduced from $1,200 per cubic foot to 10 cents with the promise of further reduction in cost to 3 or 4 cents. In addition to Dr. Moore's resignation, Mr. Raymond B. Ladoo, of the engineering staff of the Bureau, has resigned to become general manager of the Southern Minerals Corporation, which is planning the development of some of the non-metalliferous resources of the south; and Mr. A. W. Ambrose, assistant director of the Bureau, has resigned to become associated in an executive capacity with the Empire Companies, with headquarters at Bartlesville, Okla.

We have had nothing in this country quite corresponding to this state of things, but the changes mentioned indicate a danger of the State losing direct scientific service of great value. It is true that those who vacate official posts to engage in industry are not lost to science. It is, indeed, their scientific attainments which industry needs. At the same time, industry exists for profit-making, and not for the advancement of science itself, while in academic or official positions the chemist or other scientist is free to exclude commercial considerations and pursue pure research. This latter is a factor of the highest importance. It is work which the State is increasingly undertaking for its own preservation and advance, and it would be regrettable from every point of view if the State were deprived of the services of first-class men. The lessons of the American situation are worth recalling for the attention of the Government and of the various other bodies which require the best scientific service the country can command.

Reactivation of Silica Gel

SOME recent tests which have been made in America with silica gel leave the impression that the life of this highly useful absorbent shows indications of being indefinite. It is now nearly three years since we heard from Mr. E. B. Miller of Baltimore that the (then) new process for the absorption of gases had been perfected on a semi-technical scale and that the discoverers were only awaiting certain engineering modifications before turning their process to general industrial use. Porous bodies, *e.g.*, charcoal, have been employed for many years for the adsorption of gases and vapours, but difficulty has usually been experienced in preparing a substance of constant properties. It was eventually found that absorbents could be prepared from certain colloidal solutions, of which the most satisfactory appears to be the material derived from silicic acid, and known as silica gel. This material is readily and cheaply made from silicate of soda and either hydrochloric or sulphuric acid, and it is particularly inert and, therefore, stable in air even at high temperatures. The physical properties of the gel, properties which are of primary importance in determining activity, appear to satisfy all the necessary requirements, and some remarkable results have been yielded by experiments conducted with quite a wide range of gases and vapours.

One of the most interesting propositions related, if we remember correctly, to the utilisation of the gel in pulverised form, and its discharge into the gas atmosphere by means of apparatus similar to that employed in pulverised coal installations. After being fed into the gas stream the pulverised dust could subsequently be brought down by a dust collector, thus permitting of continuous operation. This was a projected development of which we have no very recent information, and it would be instructive to know whether further progress has been made with it.

The work carried out recently by Messrs. Faber and Olson in the research laboratories of the U.S. Chemical Warfare Service at Edgewood was undertaken with the object of determining the number of times which silica gel could be successively used for absorption without showing any marked deterioration in its absorptive power. A series of runs were made with water, benzene, nitrogen peroxide, and nitric acid; and, after saturation, a current of dry air was passed through the material in order to reactivate it. The cycle of absorption followed by activation was carried out in some cases from 60 to 80 times successively, and in no case did the gel appear to exhibit any evidence whatever of disintegration or deterioration. Most remarkable, perhaps, is the fact that even after all these numerous absorptions and reactivations the material exhibited no loss in absorptive efficiency. The experiments should be a matter of interest to chemists in this country, for we understand that silica gel is already attracting quite a considerable amount of attention over here.

Motor Spirit from Vegetable Oils

WE have frequently referred to the moderately promising attempts which have been made to prepare petroleum products for lubrication by artificial means, and recent investigations in France seem to indicate the possibility of producing an artificial fuel suitable for internal combustion engines from animal and vegetable oils. The use of such oils as a fuel is by no means a novel proposal, for their utility in engines of the semi-Diesel type was demonstrated some time ago, but we do not recollect any suggestions such as those which are now made that the oils should be transformed by catalytic dehydration and subsequent hydrogenation. The commercial attractions of a process of the kind must necessarily be entirely dependent upon local circumstances, and with a country such as France, where the provision of home-produced motor spirit is a standing problem, the scheme has undeniable attractions for the reason that the French colonies are capable of yielding an almost inexhaustible supply of crude vegetable oils. As we have lately pointed out, France has already made a start in her attempt to render herself independent of overseas sources by introducing legislation compelling the use of her surplus alcohol, and although use has long been made of her colonial vegetable oils these have mainly been employed in the manufacture of food products and soaps.

The proposal that the oils should be treated and transformed into motor spirit comes from Professor Mailhe, of Toulouse, who has demonstrated that by catalytic dehydration vegetable oils may be decomposed and made to yield, among other things, low-boiling liquids. The last-named are then submitted to hydrogenation, when they give a liquid closely resembling petrol in appearance and properties, and so far as behaviour in the internal combustion engine is concerned. The raw materials which were examined and treated were linseed, palm, fish, coconut and cottonseed oils, and all were found to yield similar results. Professor Mailhe states that in general the process consists of two steps—namely: (*a*) The rupture of the complex glyceride and the elimination of the oxygen in the form of water, acroleïn, carbon monoxide and carbon dixoide, excess acids being neutralised with soda to give a product resembling unrefined cracked petrol; and (*b*) transformation of the last-named into water-white petrol by catalytic hydrogenation in the presence of nickel, using either hydrogen or water gas for hydrogenation purposes. The method is, perhaps, unusual and very possibly expensive, but it must be remembered that in France the situation justifies the consideration of abnormal processes.

The Mining Exhibition

THE visitor to the International Mining Exhibition, at present open at the Agricultural Hall, Islington, London, cannot fail to be struck by the many points of contact between the mining industry and the chemical industry. Both have special problems in engineering which are very similar and in some cases identical, while in many cases the product of the mines, whether it is coal or metallic ore, becomes the raw material of the chemical manufacturer. One of the features of the present exhibition is the number of specialised machines. These include power plant—for instance, electric motors which may be safely used in explosive atmospheres, numerous air-compressors and pneumatic appliances, and labour-saving devices, among which

the most striking are an automatic ore grader which separates the ore according to size, and several ingenious conveyors which transport materials over obstacles to any desired spot without the need of labour to push trucks, etc. Another feature is the large number of exhibitors showing miners' electric safety lamps and apparatus for charging the necessary accumulators readily on a large scale, while a demonstration of oxygen respiratory apparatus to enable workers to enter dangerous fumes shows that the work of the industrial research chemist is as necessary to the mining engineer as it is to the chemical engineer.

The exhibition is remarkable for its international character, the Governments of France, Belgium, Mexico and Columbia being officially represented, and in addition numerous exhibits are staged from the United States, Malaya, Nigeria, etc. The "academic" side of mining is also well represented in exhibits of safety appliances and analytical apparatus from the British Universities, the Fuel Research Board, and the United States Bureau of Mines, whose valuable work is frequently referred to in these columns. The Industrial "Safety First" Council also have a very striking series of posters issued to the mining industry in connection with their campaign. Finally the exhibition itself has a cheerful and busy aspect, due to the fresh paint on the building itself as much as to the individual stands with their machinery in motion, and the bright but not gaudy hangings deserve mention. The organisers must be congratulated on having adopted an extremely convenient method of numbering the stands, so that there is no difficulty in finding a particular exhibit from the excellent official catalogue.

Professor Smithells' Work

IT has been known for some time that Professor Arthur Smithells was resigning the Chair of Chemistry in Leeds University and coming to London to take up research work. He will, we are glad to hear, not be allowed to leave Leeds without some definite memorial of his work there. It has already been decided to raise a fund for the purpose of having his portrait in oils presented to the University and of establishing a Smithells Fellowship or Scholarship at Leeds. In a circular inviting subscriptions it is stated that since Professor Smithells went to Leeds in 1885 to take the Chair of Chemistry in the Yorkshire College he has played a very distinguished part in promoting the foundations and development of the University of Leeds, in bringing technological studies into intimate association with the other work of the University, in furthering his own science and its technical applications, and in linking up in various ways the University with the community it serves. The fund is in charge of a committee, and cheques and orders may be made payable to "The Treasurer, Smithells Fund, Beechword, Roundhay, Leeds."

Publicity for Chemistry

UNLIKE the policy pursued in this country, the policy of our American colleagues is all in favour of keeping the public informed of chemical movements, and systematic steps are employed to impress the importance of the profession and industry on the public mind. The latest development is the institution of popular talks on chemistry to be broadcast every Thursday evening throughout June in New York. There is no immediate result from such efforts; what is aimed at is a general effect, which is wholly favourable to the chemical interest and produces a popular sense of its value. It would be, perhaps, too daring to suggest a similar line of policy here, though there are a dozen men, whom one could name off-hand, admirably qualified to entertain us with stories of what chemistry is doing for the public service. Even short of this, there are means of keeping the public in touch with chemical movements, both through the press and through the open platform, and in time it is certain to be realised that this is a profitable policy from every point of view.

Points from Our News Pages

The concluding sections are given of Mr. F. M. Potter's article on "Methods of Costing in Chemical Works" (p. 612).

Several exhibits at the International Mining Exhibition, now open at the Agricultural Hall, London, present features of interest to industrial chemists and chemical engineers (p. 616).

The present position of the British and German Chemical industry is reviewed (p. 617).

Some particulars of his stream line filter were given by Dr. Hele-Shaw at the London Section of the Society of Chemical Industry on Monday (p. 619).

Business has been fairly active with steady prices and better export demand, according to our London Market Report. (P. 627.)

Business remained quiet this week according to our Scottish Chemical Market (p. 630).

The Calendar

June		
9	North of England Institute of Mining and Mechanical Engineers: General Meeting. 2 p.m.	Lecture Theatre of the Institute, Newcastle-upon-Tyne.
12	University of London: "The Structure and Behaviour of the Molecule" (Lecture III.)—The Sources of Chemical Affinity (Atomic and Molecular Dynamics). 5 p.m.	University College, Gower Street, London, W.C.1.
12,13 & 14	Institution of Mining Engineers: Summer Meeting.	Glasgow.
14	Chemical Society: "Les Gaz Rares des Sources Thermales, des Grisous et Autres Gaz Naturels." Professor Charles Moureu, President of the Société Chimique de France. 8.30 p.m.	Burlington House, Piccadilly, London, W.1.
15	Royal Institution of Great Britain: "The Life History of an Alpha Particle from Radium." Sir Ernest Rutherford. 9 p.m.	Albemarle Street, Piccadilly, London, W.1.
16	Royal Institution of Great Britain: Atomic Projectiles and their Properties" (Lecture VI.). Sir Ernest Rutherford. 3 p.m.	Albemarle Street, Piccadilly, London, W.1.
20 to 23	Society of Chemical Industry: Annual Meeting.	Cambridge.
29	Brunner, Mond and Co., Ltd.: Dinner to Celebrate the Fiftieth Anniversary of the founding of Winnington Works. 8 p.m.	The Hotel Victoria, Northumberland Avenue, London.

Methods of Costing in Chemical Works.—II.

By F. M. Potter, F.I.C.

In a recent address to the chemical students of the Northern Polytechnic Institute, London, the author dealt with the important question of costing in chemical manufacture, and this address forms the basis of the following article. The opening section was given last week.

Losses in the solid by-products call for chemical analyses. In the case of nitre cake from the nitric acid retorts, a good cake will be found to contain 28–30 per cent. free acidity, calculated as H_2SO_4, and only a trace of nitrogen. The acidity of the cake must be the lowest possible, consistent with obtaining a cake fluid at the temperature at which the retort operation is completed. Incorrect measurement of the charge may yield a cake containing excess acidity, or a cake that cannot be run off until re-heated with a further addition of acid. In both cases, a loss of acid will be involved, in that the "doping" is not usually adjusted to give the normal figure; in addition there is, of necessity, a labour and fuel loss. Where loss of solid products during handling occurs it will be apparent to the keen observer. In the case of nitrate of soda, there is a loss on the bags, and about 2 lb. of nitrate per bag may be recovered in a small bag-washing plant. Such a unit would not pay on the small scale, but special prices may be obtained for the unwashed bags from merchants.

Having determined quantitatively the ultimate destination of the whole of the valuable element under consideration, a balance-sheet should be constructed showing, on the one side, the total quantity entering the factory, and on the other the quantity dispatched as finished product, together with the quantities in the respective by-products and sources of loss. This should be then set out on a percentage basis, and reduced to graph form. A striking method of demonstrating the balance is that shown in diagram II., in which we have followed up the nitrogen as our valuable element, not only through the acid plant, but also through the nitrating plant where the acid is used for the preparation of an organic nitro body. The shaded area represents the valuable recovery, and the unshaded area the losses. A similar diagram may be prepared for the acid plant only. Alternatively the quantities may be set out on the process flow diagram, as shown in III. The first method brings home at a glance the opportunities available for economy in nitrogen use. Unfortunately, I cannot give two diagrams from the same factory, but in every case the improvement in the raw materials figures in Ministry of Munitions factories was continuous throughout the war period, and represented the financial saving running into tens of thousands of pounds sterling per month.*

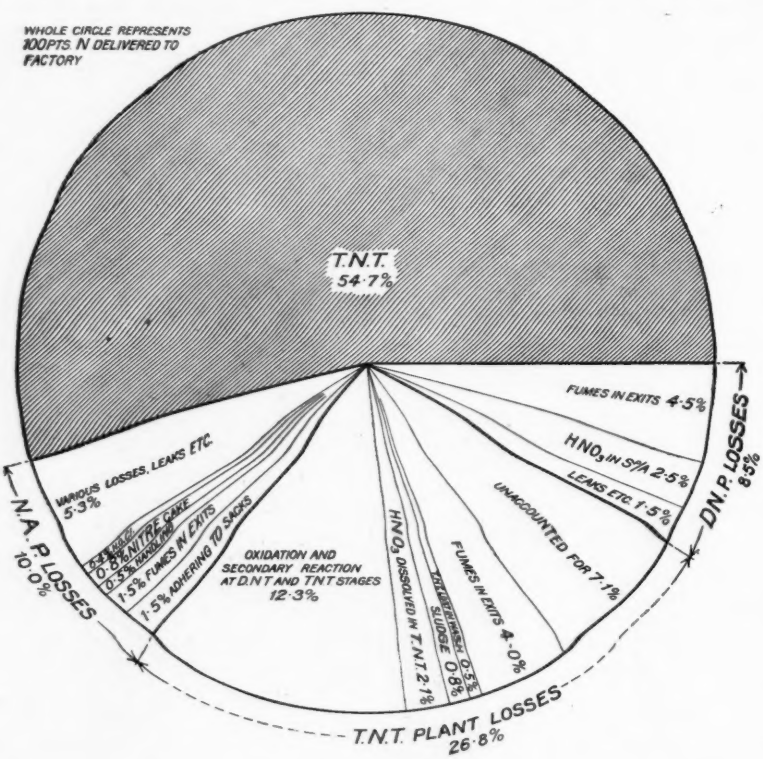
WHOLE CIRCLE REPRESENTS 100PTS. N DELIVERED TO FACTORY
T.N.T. 54·7%
FUMES IN EXITS 4·5%
HNO3 IN S/A 2·5%
LEAKS ETC. 1·5%
D.N.P. LOSSES 8·5%
UNACCOUNTED FOR 7·1%
FUMES IN EXITS 4·0%
TOLUENE IN WASH SLUDGE 0·8%
HNO3 DISSOLVED IN T.N.T. 2·1%
OXIDATION AND SECONDARY REACTION AT D.N.T AND T.N.T STAGES 12·3%
1·5% ADHERING TO SACKS
1·5% FUMES IN EXITS
0·3% NITRE CAKE
0·8% NITRE CAKE HANDLING
0·3% WASH WATER
VARIOUS LOSSES, LEAKS ETC. 5·3%
N.A.P. LOSSES 10·0%
T.N.T. PLANT LOSSES 26·8%

Diagram II.—Ultimate Destination of Nitrogen

This diagram is for the year 1916. At the end of eighteen months the production of T.N.T. had risen to 78·68%

Continuous Improvement

The change in the figures from 1915 to 1918 were the result of continuous hard work by the staffs of the factories, but I do not think the continuous slope of the curve would have been maintained had it not been for the system of monthly meetings of factory managers and departmental heads, at which the cost sheets were critically studied, suggestions for improvements received, results of observations at a given factory placed before all concerned for their information, and finally for the helpful criticism of Mr. Quinan and his assistants. These headquarters meetings were followed by staff meetings at the factories, when the junior staff was given a general account of the headquarters proceedings. It is true that in the commercial world the costs accounts of competitors cannot be inspected, but frequently a company may control more than one works, utilising the same process, and, in any case, on the raw materials item the theoretical 100 per cent. efficiency serves as "bogey."

As illustrations of the value of this work, the following extracts from the records of the Department of Explosives Supplies are of interest.

Raw Materials Consumed per Ton T.N.T. Produced.

	Toluene.		Nitric Acid.		Soda Nitrate.		Total H_2SO_4.	
	April, 1917.	April, 1918.	April, 1917.	April, 1918.	April, 1917.	April, 1918.	April, 1917.	April, 1918.
Factory								
C	0·525	0·488	1·34	1·064	2·01	1·545	2·70	2·06
Q	0·485	0·477	1·12	1·010	1·67	1·43	2·14	1·773
O	0·474	0·475	1·15	1·010	1·69	1·44	2·24	1·917

* At Queensferry the improvement in the use figures between the first half-year and second half-year 1917 represented a financial saving of £45,000. The saving on all T.N.T. plants as between the same two periods was £167,000. On nitric acid plants, comparing the corresponding periods in 1916 and 1917, the financial saving in the latter period was £130,000.

EFFICIENCIES OF ALL NITRIC ACID PLANTS.

—	Efficiency of Nitrogen Recovery.	Tons 100% H_2SO_4 per ton 100% HNO_3.
1916—1st half ..	87·6	1·578
2nd half ..	90·5	1·474
1917—1st half ..	92·4	1·421
2nd half ..	92·7	1·405
1918—1st half ..	93·5	1·398

In the last period the best factory gave 94·7 to 95·0 per cent. recovery and none under 90 per cent.

The remaining charges may be considered in the first place under the inclusive title of "Service Charges," and attention may be drawn to one or two factors that exert an overall controlling influence, in general, of greater importance than economies effected in independent items. Rate of output from a given plant unit or units is perhaps the most important of these. If by better organisation, and not by increasing the number of units worked or the number of men employed, output is increased 10 per cent., the service charges in general will frequently be reduced by this amount. On the nitric acid sheet the reduction in cost would not be fully proportionate to increased output since the fuel charge per ton of acid, for instance, would obviously not be reduced 10 per cent., but the reduction would reach a figure of the order of £0·5 per ton—no slight consideration. This applies up to the point at which the plant is strained beyond its optimum working capacity, beyond which the supplies of steam, water or effective cooling surfaces become unequal to their task with consequent inefficient process results.

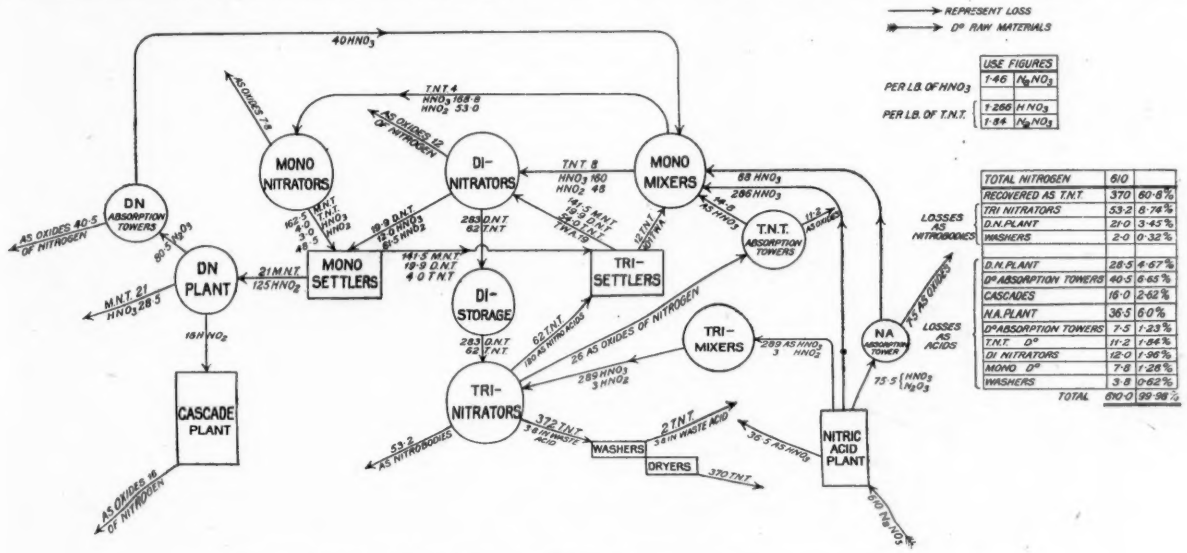

DIAGRAM III.—Flow Diagram of Nitrogen, H.M. Factory, Litherland, June, 1917.
Basis 2,000 lb. T.N.T. All figures are in lbs. Nitrogen.

Maintenance of Balance

A second factor in a works where there are a number of subsidiary processes is the maintenance of balance between plant sections, so that stocks of intermediate products do not accumulate at one point, leading eventually to the temporary cessation of work on one or more sections until the other plant overtakes the accumulation of stocks behind it. This factor was of importance in large factories, such as Queensferry, with its numerous nitrobody and acid manufacturing units and acid concentrating plants. To maintain control of stocks and daily output the stocks of material at each point were chartered against the optimum stocks and the daily and weekly outputs were graphed in terms of units equivalent to a unit of the finished product.

Passing to the individual items on the costs sheet, the reduction in the labour charge lies very largely in the hands of the plant chemist. The reduction possible by improved organisation and process methods is usually far greater than any assistance to be expected by the reduction of rates of pay. It may be found that the process is being worked so that over a short period of say two hours there is a peak demand for labour, followed by a period of lower requirements, and the labour use curve throughout the 24 hour of maxima and minima. By standardising the conditions on the plant it may be possible so to arrange the operations that the labour requirement at any moment is close to the average line, hence leading to the employment of the minimum number of men by the company. In the case of the nitric acid plant, the cycle of operations of a retort should be graphed and then the cycle for No. 2 retort is arranged so that its main labour requirement, that for charging nitrate, follows directly upon that of No. 1. Nos. 3 and 4 retorts, etc., then follow consecutively. An incomplete period occurring during —or, maybe, at the end of—each 24 hours, and which shows a minimum labour requirement, is noted, and the labour available is earmarked for some special work on the plant, not necessarily directly concerned with the process cycle. It is not possible in the space available to elucidate this at great length, but only to indicate the general procedure.

General yard labour, as distinct from process labour, requires similar consideration. In a badly organised factory each section will call for men at 7.30, and gangs of men to tackle all the jobs on hand will be employed. In the afternoon, groups of these men will be left with nothing to do, discreetly avoiding the manager until the hooter blows. By better organisation many of the jobs could be completed on the previous afternoon, or left until the coming afternoon, so that a minimum mobile labour force, which is kept fully engaged, is employed. Overtime at special rates should be controlled and reduced to a minimum, not only for economy of labour usage and efficiency of work but also with regard to the welfare of the employee.

Mechanical Handling and Fuel Costs

The question of the mechanical handling of materials lies chiefly within the province of the engineer or chemical engineer. The introduction of new plant for this purpose may be suggested, but the matter will require a calculation of the cost of installation, and from this the interest payable per annum on this cost as against the labour saving estimated by the chemist in charge of the plant. Again, I would emphasise the point that organisation entails little or no new capital expenditure but an expenditure of thought, for which the chemist personally is paid, and is therefore capable of early application. I shall not in this paper consider the points arising out of the adoption of piecework rates or bonus.

The fuel used, exclusive of that employed in steam raising, cannot in most cases be compared readily with the theoretical

figure, but a heat balance sheet showing the disposal of the thermal units present in the original fuel may indicate excessive losses—in the flue gases for instance—and point to the possibility of reductions by the addition of economisers to recover part of this heat, or the use of a regenerative setting. Alternatively, incomplete combustion or the use of excessive air supplies may be shown by flue gas analyses, and require attention to the fire control. A large radiation loss will suggest the necessity for lagging the vessel or redesigning the setting of the furnace, as the case may be. Attention should also be directed to heat recovery from vapours by using counter-current flows of ingoing material against outgoing distillates. Continuous running units will lend themselves, as a rule, to the use of this principle.

Steam costs vary in their importance with the nature of the process, and may be considered under the headings of cheap steam raising and of economical steam use. Cheap steam raising is largely the engineer's duty, but the chemist may well co-operate in carrying out periodic 24-hour and weekly test runs. The engineer carries through a test which determines the gallons of water evaporated at 212° F. per lb. of fuel, but usually omits to locate the sources of heat loss, and therefore cannot prepare the balance sheet which, as I

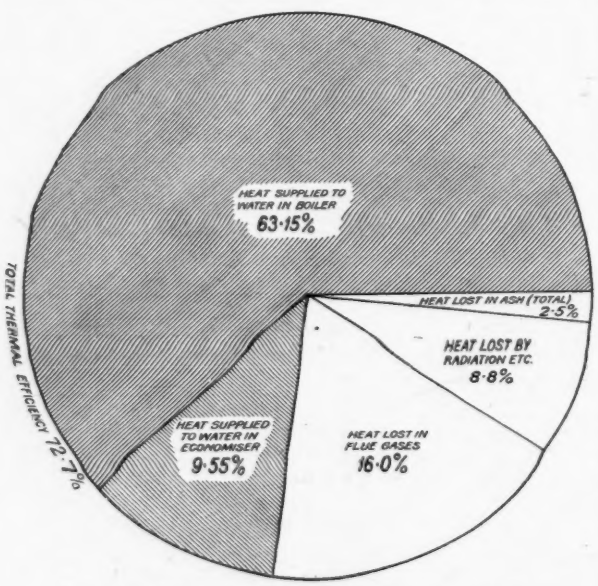

DIAGRAM IV.—Heat Distribution in Boiler Plant

am pointing out at each stage, is the first step towards tackling the losses. By co-operation with the chemist, flue gases are analysed, fuel and clinker likewise, and a complete set of temperature readings taken throughout the plant. From known data for the specific heat of gases, etc., no difficulty should be experienced in completing the account sheet. Leaky settings, bad stoking, excessive air supplies, if present, will be demonstrated by the figures (diagram IV.). Economic steam use may depend simply upon effective steps being taken to use all exhaust steam for preheating purposes, the proper use of steam traps kept in good working order, the stoppage of steam leaks, etc., or may depend upon the complicated case of adjusting the process conditions so as to economise steam. For instance, it may be possible by standardising the conditions, and with good temperature control, to utilise the heat of reaction to supply sufficient heat to raise the charge to the temperature necessary for completion of the reaction. In the T.N.T. process, as originally worked at Oldbury, the temperature of the charge was restrained below 70° for the first hour by the use of cooling water passed through coils. Much of the heat of reaction was thus removed in the cooling water, and it was necessary to use steam to reach the final temperature of 110-120° required for practically complete trinitration. A study of temperature and chemical conditions led to the adoption of a steady temperature slope, the gradient being such that throughout the process the quantities, both the cooling water and steam, used were very small, while, at the same time, side reactions remained at a minimum.

Frequently in chemical factories, a large proportion of the steam generated is used on the process plant for maintenance of storages and pipe lines at a suitable temperature. To keep the steam charge down it is necessary, therefore, to maintain a high rate of output, or to cut out, if possible, complete sections, storage steam coils and steam mains.

The power item, except on electrolytic processes, converts itself very largely into the natural common sense procedure of avoiding unnecessary work. The force of gravity should be made full use of, the plant design should be such that the materials pass steadily forward in a given direction, covering the minimum distance in their travels, and the resistance in the path of flow—due, for instance, to badly designed pipe lines, etc.—should also be a minimum. The use of power for electrolytic purposes requires study much along the lines indicated under the fuel item.

Plant Maintenance

The cost of plant maintenance is, as a rule, a heavy item, and responsible for much of the difference between the estimated cost of the laboratory worker and the final works cost. It provides wide scope for the application of thought, ingenuity and previous experience. This item must be subdivided into two sections, viz., materials and labour. Materials charges may be high owing to the use of an unsuitable material, to faulty design of the vessel or of its setting, or to process conditions which place an unnecessary strain on the plant. The first step is to commence a diary of plant breakdowns, and then particularly to consider any frequently recurring repair.

Reverting to the nitric acid process, a variety of materials will be used in different sections of the plant. The retort, subject to the action of heat, sulphuric acid and nitric acid vapours is constructed of cast iron, the vapour pipes, condensers, and fume mains may be of fused silica, earthenware, glass or ferro-silicon alloy, the absorbtion towers may be of earthenware or acid resisting brickwork. The condensed acid may be run through pipe lines of ferro-silicon alloy, earthenware or lead, according to its strength. Choice of material depends upon the ratio of economic life to first cost, and is a matter of experience or trial after critical examination of the makers' claims. The nitric acid retort purchased from a reliable plant manufacturer will be made of a suitable grade of chemical cast iron, and it remains for the plant chemist to see that it is subjected to fair treatment. While in the majority of factories, little trouble was experienced with the retorts, in one case a whole battery of retorts gave out in rapid succession after a very short life. This was shown to be due to a faulty setting, the bottom of the retort being subject to the direct action of a gas fuel flame above the point of combustion.

Faulty Conditions

In other cases a sudden change in the direction of flow of a liquid has been shown to cause excessive corrosion at one point, leading to failure of the vessel, due not to equal wear throughout but to vigorous local action. As another illustration of faulty conditions, one may mention the case of iron nitrating pots which were found to be badly corroded at the line corresponding to the surface of the charge. During the process, the sulphuric acid content of the charge was diluted from 92 to 85 per cent. by the addition of water, and it was found that the dilution water, due to corrosion of the dip pipes, was not being delivered into the charge in such a position that it became immediately mixed. The temporary existence of an acid below 65 per cent. strength led to the heavy attack on the metal.

In another case, a lead launder with lead cover was used for conveying a hot spent nitration acid containing 85 per cent. H_2SO_4, 2–3 per cent. HNO_2 and about 5 per cent. HNO_3. The spent acid had no action on the lead, but the recondensation of the nitrogen acids, which distilled from the hot liquids, gave rise to heavy attack on the metal, necessitating frequent renewal. The frequent recurrence of breakdowns on this launder led to the replacement of the lead by a stoneware launder, built up of rebated sections; the trouble then disappeared. Again, by slight alteration of process conditions, it

may be possible to main the strength of acids at points which lead to minimum corrosion of the metal used. Cocks and valves are a source of continuous trouble in plants handling corrosive acids. On large factories a testing station fitted with 60 lb. per sq. in. steam and 100 lb. per sq. in. water pressure is a paying proposition. A small lathe for overhauling secondhand cocks should be installed. All new cocks not passing the test are rejected and returned to makers; secondhand cocks are ground in to the required degree of accuracy. At a nitration plant where heavy 4 in. 3-way cocks were in use it was found to be economical to order plugs $\frac{1}{16}$ in. above the mean size, and cock bodies $\frac{1}{16}$ in. below the standard size. When the plug became badly corroded a cut was taken off it, and it was ground into the next size smaller body. As a body became corroded it was bored out to take the next larger size in plugs. In this way the original casting had three to four lives.

A frequently recurring repair, in addition to a materials cost, means also the maintenance of a large staff in the engineer's departments. The control of the maintenance staff falls upon the engineer, and it is for him to devise methods of time-work control, to adopt piecework terms, or other measures to reduce costs. The plant chemist should remember that all repair labour, whether requiring fitters, plumbers, or carpenters, etc., is relatively expensive. To the actual time taken for the work must be added the time taken by the mechanic to collect his tools and materials, to come over from the shops, and to make an effective start. Where more than one material is involved—say, for instance, lead, iron and timber, in the construction of a condenser tank and coil—it may be necessary to send for the pipe-fitter and his mate, the plumber and his mate, and the carpenter and his mate. In each case the foreman must issue instructions, and probably also visit the job. The process worker no longer effects the majority of minor plant repairs himself, and it is for the plant chemist to neutralise the upward tendency of repairs costs, due to changing conditions, by eradicating the necessity for such repairs wherever possible.

Accident and Sickness Costs

With matters arising out of "on cost" I do not propose to deal, since these are individually controlled by the management and not by the plant chemist. In some directions, however, the plant chemist may materially assist the desired end and reduce the burden of this charge. Consider, for instance, the matter of compensation for accident and sickness. The incidence of these may be reduced by improvements in plant design—for instance, by installing plant that will ensure the removal from the factory atmosphere of all obnoxious and injurious vapours and dust; by alteration of process conditions so that the formation of dust or of obnoxious fume is reduced to a minimum; by plant cleanliness leading to cleanliness of the worker himself, the general experience being that the dirty, careless worker is the sufferer from the effects of an industrial disease; by insistence upon good plant discipline, giving the workers instruction in "first aid" methods to be adopted in the case of accidents of a nature likely to happen on the works, such as gassing by nitrous fumes on a nitric acid or nitration plant, or carbon monoxide poisoning on a producer gas plant.

A clean plant is usually a well-managed plant. If the surroundings are dirty, leaks and losses are not so easily discernable. The chemist should make himself acquainted with the outward symptoms of any industrial disease which may be likely to occur, and, when a probable case is observed, see that the man is examined by the works' doctor at the earliest possible opportunity. Many industrial diseases are cumulative in their effect, and are amenable to curative treatment if attacked sufficiently early. The war-time records of T.N.T. factories clearly demonstrate this point. In 1915–16 period fatal cases were only too frequent, whereas as soon as information rapidly accumulated by the Home Office staff became available, not only to factory surgeons but also to the technical staff, the number of fatal or serious cases commenced to show a rapid downward tendency.

The plant chemist may be in a position to observe the bearing of certain factors not known to the doctor—as, for instance, it may be found that a number of workers on the one shift develop symptoms at the same time, and this following a week on the morning shift which comes on duty at 6.30 a.m., the trouble being due to the increased absorption of dust during the time between coming on duty and the breakfast halt, when the man is probably working on an empty stomach. Quite apart from any "humane" consideration, it will probably prove a paying proposition to issue a free supply of, say, cocoa containing a liberal quantity of milk with a biscuit to the men coming on duty at 6.30. This note refers, in particular, to a poisoning case similar in condition to that of T.N.T., but it serves to illustrate the possible procedure. Again, the Home Office and the factory management, by reason of their experience, issue certain safety regulations, and it is for the plant chemist to assist in seeing that these are faithfully applied.

A State of Perfection

These notes do not exhaust the possible lines of attack, but it is hoped that they may serve to draw attention to a few possible useful inquiries which might be made by the plant chemist. In some respects they may be said to represent an unattainable state of perfection for a chemical works, but it is always an advantage to have clearly set out something of the nature of things to be aimed at.

Two suggestions run through this paper: (*a*) the first step towards an increased efficiency is quantitatively to analyse the losses; (*b*) "many a mickle makes a muckle."

On the question of training let me add one word—the student should endeavour to obtain a good general training over a wide scientific field, studying principles rather than facts. A sound knowledge of thermo-chemistry and of physics is of more value to the junior chemist than a highly specialised knowledge of the plant and processes of a particular industry unaccompanied by sound general training. A works' chemist has to remember that his justification lies not in making a compound but in supplying a product that can be sold at a profit.

Accurate Glass Tubes

To the Aix la Chapelle section of the Institute of German Chemists an interesting report was presented recently on the new "Küpper" process for the manufacture of glass tubes with absolutely accurate internal diameters. This process gets round the difficulties hitherto encountered in the manufacture of precision glass tubes in a very ingenious manner. Drawn glass tubes are never quite uniform and accurately round inside, and although the deviations are small, they are sufficient to necessitate very troublesome subsequent finishing, more especially in the manufacture of measuring flasks or tubes for precision syringes. Every tube used for a measuring flask must be gauged separately and the scale cannot be transferred to other tubes. Also the tubes of precision syringes must be reground individually and the plungers must be fitted separately; the plungers are naturally not interchangeable under these circumstances, and any one of the plungers will not fit a tube without being specially adjusted.

According to the "Küpper" process an accurately cylindrical metal core is inserted into the drawn glass tube; thereupon the tube is evacuated and the outside is slowly heated up. Thus the glass becomes soft and the outer atmospheric pressure forces the walls into intimate contact with the metal core, so that the interior of the tube takes exactly the dimensions of the metal core. The glass tube has a higher coefficient of expansion than the metal core. After cooling, therefore, the core can easily be withdrawn from the tube and may be inserted into another tube to be calibrated without any preparation being required.

As proof that this process works well, a great number of tubes made by this process were presented at the meeting, and the members present could convince themselves that the measuring flasks were exactly alike as regards divisions and that one metal plunger fitted a number of precision syringes with equal accuracy.

It follows from the manufacturing process that the differences in the inside diameter of tubes made from one and the same metal core can only amount to an infinitesimal fraction of a millimetre. Very remarkable also are the possibilities of making by this process calibrated tubes of square or tapered internal space or to bed wire coils or netting into the interior of the glass tubes by means of a metal core.

Features of Interest at the Mining Exhibition

We give below a short description of various items of interest at individual stands at the International Mining Exhibition now open at the Royal Agricultural Hall, Islington. The closing date is June 14.

Imperial Mineral Resources Bureau

On sale at this stand is an official series of digests of technical information relative to the sources, uses, production and consumption of all the more important minerals and metals in all parts of the world, each being dealt with in a separate publication. Statistical and legal publications covering the same field are also supplied, and a special report is available on lead poisoning regulations.

British Petroleum Co., Ltd.

In addition to models of a tank steamer, wagon and derrick, there are exhibited pumps and other sundries of fuel distribution, together with samples of petrol, fuel oils, lubricating oils and sulphate of ammonia produced by the firm.

The Victaulic Co.

The exhibit of this firm is concerned with the " Victaulic " pipe joint, which is a joint for piping carrying water, air or non-corrosive gases under pressure. By means of a simple rubber washer arrangement a permanent joint is rapidly made which possesses a certain flexibility which is particularly valuable where any factors are present likely to disturb the pipe lines. This property is very ingeniously shown at the stand.

E. Green and Sons, Ltd.

Green's economiser for heating the feed-water of boilers by waste heat from the flue gases is shown in full size on this stand, an essential part of the plant being the scraping gear by means of which the soot, etc., is scraped off from the water-tubes continuously, thus ensuring maintenance of efficiency.

Chemical Engineering and Wilton's Patent Furnace Co., Ltd.

Wilton's furnace for boiler heating is shown on this stand in full size, sectioned. This works on the forced draught principle and is extremely simple. There is a complete model of an oil refinery plant, and diagrams are shown of plants erected by the firm for tar distillation and cracking, and for sulphate of ammonia, a speciality being plant for neutral sulphate.

Hobdell, Way and Co., Ltd.

Asbestos packings, pipe laggings, insulation and other engineering sundries are shown on this firm's stand, a speciality being the " Hobsil " heat-resisting compound.

Richard Scholefield

The whole of this stand is occupied with a " Scholefield " No. 1 stone dust grinding mill, and examples of the work done by the machine.

Ronald Trist and Co., Ltd.

A feature of this exhibit is the " Raybeam " electric gauge glass illuminator, which consists of a very simply attached electric lamp which, when fixed to a boiler gauge glass, shows a clear red disc on the water level. Nothing in any way is added to the water, the whole arrangement being external.

George Porteus and Sons (Leeds), Ltd.

Among a comprehensive selection, chaff-cutters, dust extractors, and other milling machinery, is to be found a Premier patent grinding mill on this stand.

Huntingdon, Heberlein and Co., Ltd.

The principal feature of this exhibit is an " Overstrom " patent automatic vibrating screen for sifting and concentrating all classes of materials. Drawings and prints are shown of other specialities, including mechanical ore roasting furnaces and accessories.

Hugh Wood and Co., Ltd.

The exhibit of this firm consists mainly of mining machinery, but an interesting feature is the " Jeffery " swing-hammer pulveriser, which is available in sizes for grinding all classes of material.

Mining Appliances Co.

The patent conveyor for transporting materials up to the rate of one ton per minute continuously is the principal feature of this stand. The device is particularly suitable for short hauls, and is able to carry loads up grades of 1 in 12.

British Engine, Boiler, and Electrical Insurance Co., Ltd.

Much information is available on this stand as to the upkeep and maintenance of boilers and electrical plant, and questions of insurance and inspection are the speciality of this firm.

John Thompson, Ltd.

On this stand there is a full size " Kennicott " water-softening plant in action, of the type suitable for boiler feed water, and convincing figures are given showing the economy of softening unsuitable water by this method which uses only small quantities of lime and soda. Another plant for reducing water to zero hardness for chemical purposes is also shown, together with other specialities such as superheaters.

The Fusion Corporation, Ltd.

In this exhibit there is shown a working model of the Fusion process. The details included are those usually employed when the process is applied to the low-temperature distillation of coals, cannels, shales, etc. The fusion principle, with certain modification in detail, is also applied in the extraction of water or other liquids from solids wherein such solids are in or pass through a plastic or semi-plastic state, such as caustic lime sludge, china clay, etc., and also in the mixing of liquids with solids wherein such material passes through a plastic state, such as lime slaking. Samples of pure lime products by Electro-Bleach and By-Products, Ltd., are also shown.

Automatic Telephone Manufacturing Co., Ltd.

A striking exhibit on this stand is a visual winding signal indicator which is in continuous action, and demonstrates the reliability of the firm's automatic telephones.

W. H. Dorman and Co., Ltd.

The exhibit of this firm is mainly concerned with rock drilling plant, the power being obtained from a Dorman petrol motor and transmitted hydraulically by the " wave-power " method through " flexstel " tubing. Various forms of " flexstel " piping are shown for oil, gas, etc., under pressure, or for suction lines for the conveyance of ash, etc.

Klinger Patents

The "Klinger" patent seatless valve is a simple valve for steam liquids, etc., designed to obviate delays and waste through corrosion of the seating and it is stated to be specially suitable for pipes carrying chemicals. The " Klinger " boiler water gauge is also shown.

Siebe, Gorman and Co.

The feature of this stand is the fume chamber in which demonstrations are given of the " Proto " oxygen breathing appliance. The fumes in the chamber are so dense that a powerful electric torch becomes invisible at a distance of a few feet, but the men equipped with the respirators remain a considerable time in the chamber. Various forms of appliance for use in different gases are shown, and also accessories for use with them.

The Cornish Institute of Engineers

This is a comprehensive exhibit representative of the mining and allied industries of Cornwall, and embraces mines for tin, radium minerals, arsenic, and china clay works with their methods of working and products, copiously illustrated with maps, plans, samples of raw, intermediate and finished products.

French Section.

An important feature of the exhibition is the French Section, which contains photographs and maps of several mines and samples of the products, among which may be mentioned the Phosphates de Constantine, Tunis Phosphate (Compagnie des Phosphates et du Chemin de Fer de Gafsa), the Alsatian Potash products, the Alsace and Lorraine Mining Association exhibit, and that of the Société de Mines et de Produits Chemiques.

Present Position of British Chemical Industry

In the "European Commercial" for June 2, published in Vienna, appears the following article by the editor of "The Chemical Age," giving some general opinions on the present position of the British chemical industry:—

GENERALLY, it may be said that the chemical trade of Great Britain is steadily advancing, the improvement, though slower than many had anticipated, being sound and progressive; that the productive side of the industry, especially regarding fine chemicals and dyestuffs, is expanding; that increasing attention is being given to plant construction and design; that research and invention are attracting far more study than was formerly devoted to them; and that the general situation is more stable to-day than at any period since the war.

There is still some controversy about the Dyestuffs Act, under which no foreign dyestuffs are permitted to be imported except under licence, and the Safeguarding of Industries Act, which imposes a considerable tariff of synthetic organic chemicals of foreign origin. Various attempts have been made in Parliament to have these measures amended or repealed, but so far without success, and with Mr. Stanley Baldwin—who was largely responsible for them while at the Board of Trade—promoted to the Premiership in succession to Mr. Bonar Law, there is little chance during the present Ministry. The Acts illustrate the essential differences between the manufacturing and merchanting points of view. The British manufacturer welcomes protection against foreign competition; the importer desires freedom to buy in the cheapest market and sell in the dearest. It is from the importer that the opposition chiefly comes, and so far his interests have been over-ruled by others. The range of home-produced fine chemicals has been very largely extended since the passing of the Acts, and Dr. Levinstein recently stated that, while before the war Great Britain imported 80 per cent. of its dyestuffs, to-day we produce 80 per cent. and import only 20 per cent.

Much interest is felt in the development of Brunner, Mond and Co.'s arrangements for the production of synthetic ammonia, but so far there is but little actual information available. It is understood that their process is a modification of the Haber method, and that their large-scale experimental work is producing very satisfactory results. It is significant that the company responsible for this work has recently joined the British Sulphate of Ammonia Federation, and it will be interesting to see how the cost of producing synthetic ammonia compares with the production costs of the ordinary process. Some time ago it was announced that the British rights in the Claude process had been acquired by a British company, but of late little has been heard of this project.

The heavy chemical industry continues in a strong position, and here production is on a scale which enables large quantities to be exported. The centenary celebration in connection with the United Alkali Company formed a rallying point for a great number of firms interested in heavy chemicals and afforded an opportunity for many congratulations on the success achieved in the past and on the good prospects for the future. In a few weeks' time the jubilee of the foundation of Brunner, Mond and Co. will also be celebrated.

In point of organisation, among manufacturers, merchants and researchers, immense advances have been made in recent years. The old individualist and exclusive policy is giving way to collective and co-operative action on the familiar German lines, and there is now a much readier disposition than formerly to exchange experience and ideas respecting costs, processes, commercial organisation and so forth. The Association of British Chemical Manufacturers, founded some six or seven years ago, is the most powerful body the British chemical industry now possesses, and its organisation is steadily expanding. The chemical and dyestuff merchants have now constituted a united body to protect their interests; a new Institution of Chemical Engineers has recently been established to develop chemical studies on the engineering side; special courses in technical chemistry are being introduced in the universities, and much chemical research work is going on under the direction of the Department of Scientific and Industrial Research.

The war impressed the nation greatly with the importance of applied chemistry, and chemical services have been installed in numbers of large works as an indispensable provision for the future. On the whole, the position of the industry in Britain is viewed with satisfaction, and the future is regarded in a spirit of confidence which seems to be well justified.

"The export trade in chemicals," write Price, Stutfield and Co., Ltd., of London, "now shows distinct signs of improvement, and serious inquiries are being regularly received from the Colonies, some parts of the Continent, and the Far East. Actual business passing has served to stabilise production, which is on a more regular basis, and many factories are running at a reasonably full output. British export prices are now competitive with Continental for very many products, and in consequence there is greater stability. This means that it is possible to make firm offers of material for definite shipment, a thing which has often been impossible during the last two years or so. In sympathy, the import trade in raw materials for chemical manufacture has also improved. Stocks generally are much smaller than for some time past, so that buyers are now placing contracts for forward delivery."

It may be of interest to add that during the past month export business has actually been done by the London firm named at the following figures, all prices being according to quality and packing:—

	£ per ton.	
Nitrate of ammonia 96-98 per cent.	24—25	f.o.b. U.K. Ports.
Nitrate of lead	42—46	
Sulphide of sodium	14—15	
Chloride of lime	10—11	
Sulphur (flowers)	6—8	f.o.b. Sicilian Ports.
Sulphur (roll)	6—7	
Sulphur (rock)	6—6.10	
Nitrate of ammonia 99.5 per cent.	35—40	f.o.b. Continental Ports.
Sodium phosphate	12—14	
Potassium nitrate	25—30	
Ammonium chloride	24—28	
Sodium chloride (bagged)	20s.—40s.	

The Position in Germany

The Berlin correspondent of the same journal writes as follows respecting the condition of the chemical industry in Germany:—

It is no secret that the German chemical industry was hard hit by the war and its immediate consequences. The export of German chemicals, which was practically suspended during hostilities, set in in so small a compass on the conclusion of peace as to allow of a very formidable competitive industry arising in Great Britain and the United States. The export of hardly any one chemical product has hitherto equalled pre-war quantities. Moreover, the loss of Alsace-Lorraine has brought the German potash monopoly to an end. Then, under the influence of the tremendous mark depreciation, the costs of production have risen inordinately in Germany. Great quantities of coal had to be purchased abroad, while freights and wages have increased enormously, entailing a substantial reduction in working hours. To these handicaps must be added the French claims to a supply of nitrogen, the refusal of which was one of the reasons for the Ruhr occupation, and within the last few days the well-known aniline factory in Baden has been seized by the French authorities—an increased menace to the home supply. In the first quarter of the current year the price formation of German chemicals, which even exceeds that of the dollar, has assumed the following proportions in comparison with the prices of 1913, here given the comparative value of 1:—

	Index of Chemical Prices.	Index of Dollar Rate.
January	3,358·2	4,281·2
February	7,574·9	6,650·2
March	7,945·4	5,047·6

The price level of German chemicals has also risen beyond the index figure of industrial materials on the whole, which only amounts to 7,790. In the case of fertilisers the price development, calculated according to the same comparative unit, figures thus:—

	Potash.	Phosphoros.	Nitrogen.
February	2,790·6	4,835·7	4,946·5
March	3,458·2	6,758·8	5,654·6
April	3,458·2	5,852·9	4,747·0

Last month, it should be remembered, the renewed currency depreciation again drove up prices, more than outweighing the slight improvement noticeable in April.

Output of Nitrogen

The German output of pure nitrogen is at present about 350,000 tons—*i.e.*, some 50,000 tons more than last year. Within the last three years production has increased by about 20 per cent., and, roughly, two-thirds of the total yield is gained by means of the Haber-Bosch system. There are at present three big nitrogen-producing groups, united in a syndicate, viz., the aniline and soda factory of Baden, with its works at Oppau near Ludwigshaven and at Leuna near Merseburg, producing nitrogen by the Haber-Bosch process; the so-called "Kokerei" group, consisting of the Rhenish-Westphalian mines and the Upper Silesian coke works, united in the German Ammonia Sales Association; and finally a concern known as the "potash-nitrogen" group, the chief works of which is the Bavarian nitrogen factory at Trostberg.

The most essential condition for a cheap output of chemicals in Germany is the availability of cheap power sources, for which reason the powerful Leuna works is situated close to the big brown coal deposits of Merseburg and the Trostberg works in the immediate vicinity of the swiftly-flowing River Alz in Bavaria. The German consumption, however, is by no means covered by the output above-mentioned, which amounts to no more than 350,000 tons, while the country's requirements may be estimated at 500,000 tons, and a short time ago the German Government permitted the free import of Chile saltpetre and nitrogen, so as to provide agriculture with sufficient fertilising material. The import and export figures in this regard were the following :—

	1913. Metric centals.	1922. Metric centals.
Exports	10,351,300	996,281
Imports	5,870,261	3,449,568

Thus, while imports did not decline very considerably from the pre-war figure, exports are dwindling most alarmingly. In the first three months of the current year Germany imported 162,999 metric centals of Thomas-phosphates and 50,910 metric centals of super-phosphates, compared with exports of 23,090 and 87,980 metric centals respectively. As is well known, the Badische Anilin and Sodafabrik concluded an agreement with the French Government for the establishment of works in France, a step which was severely criticised in Germany, though it appears to have been taken under coercion.

The Dyestuff Industry

The export of German dyes decreased, between 1913 and 1922, from 2,617,390 to 1,527,742 metric centals, while, according to such statistics as are available up to date, the exports of the first three months of 1923 amounted to 364,380 centals. A comparison between the January and February returns of 1922 and 1923 respectively shows an increase from 188,841 to 257,285 centals, owing principally to greater purchases on the part of Italy, Poland, China and Brazil. The following figures indicate the amounts of aniline and tar dyes, in metric centals, in regard to the principal purchasing countries :—

	January—February. 1923.	1922.
China	18,119	5,743
Italy	4,229	2,047
Poland	6,120	—
Russia	2,013	549
Brazil	2,278	924
Great Britain	696	334
British Indies	6,553	2,638
United States	644	221

Even the preventive measures adopted by England and America have thus not succeeded in checking the increase of German exports.

Potash

The entire output of potash salts in Germany for 1922 amounted to 130.1 million centals, equivalent to 15.1 million centals of pure potash (KO), compared with 92.9 million centals of potash salts, or 10.5 million centals of pure potash, in the preceding year. This means a productive increase by no less than 43 per cent. The sale of pure potash in 1922 was 13 million centals as compared with 9.2 millions in 1921 and 11.1 millions in 1913, home consumption amounting to 9.6 million centals last year against 7.7 millions the year before. The chief inland customer is agriculture, which absorbed about 94 per cent. of the total amount disposed of on the home market. A certain quantity was sent to Soviet Russia, this being the first purchase of the kind made by that Government. The number of workmen employed in the German potash works rose, in the course of 1922, from 39,502 to 48,683.

A Chemical Method of Working Ores

Notes on the Chloride Volatilisation Process

THE United States Bureau of Mines (Department of the Interior) has published a Bulletin (No. 211) on "The Chloride Volatilisation Process of Ore Treatment," by Messrs. Thomas Varley, E. P. Barrett, C. C. Stevenson and R. H. Bradford.

Chloride volatilisation is defined by the authors as the process of separating or isolating certain metals from worthless gangue or other minerals by means of alkali or alkaline earth halides, such as salt and calcium chloride, which are added to the prepared ores in proper amounts, treated in a suitably designed furnace at temperatures high enough to form and to vaporise or volatilise the chlorides of the metals present. The exact chemical reactions are not definitely known. Vaporised chlorides of certain metals in the ores are formed and are drawn away from the heated charge into properly provided containers, whence they are recovered by some suitable means.

The art of treating ores by the chloride volatilisation process is still in the experimental stage. The process has not been sufficiently developed along metallurgical lines to warrant a definite statement as to the exact place it will occupy in the industry. The basic theory of the process has received the attention of prominent metallurgists for 20 years, and considerable research and experimental work have been carried on.

The Possibilities of the Volatilisation

If commercially utilised, the process will fill a long-felt want in metallurgy, especially in the treatment of oxidised and semi-oxidised or "carbonate" ores of copper, lead, and silver. Such ores are difficult to treat by gravity concentration or by flotation; in the former their tendency to slime upon crushing and their being of lower specific gravity than the sulphide minerals cause serious losses; in the latter much has been done in converting oxidised ores to sulphide, and subsequently recovering the artificial sulphides by flotation. Difficulties in proper sulphidising and the low recoveries obtained have not balanced the cost of the treatment in many plants and in very few has it proved successful.

Evidently there is a big void to fill in the treatment of these ores. No radical changes in present methods are suggested, but it is obvious that chloride volatilisation can have a distinct place as a method of treatment for ores that are not readily amenable to present methods. In many plants it might replace concentration methods, especially where part of the mineral content in the ores exists in forms other than sulphides.

In addition to the minerals named above, gold in ores has been readily volatilised. Zinc does not form a volatile chloride, if an oxidising condition is maintained in the roasting operations. Some excellent results have been obtained with carbonate-zinc concentrates containing silver and lead. Practically all the silver and lead were volatilised, but very little of the zinc. Experiments have proved that the process is probably one of the best for making a clean-cut separation of lead and zinc.

Applicability with Sulphides

Not much work has been done on sulphide ores, because the need is pressing for a volatilising method for treating oxidised and carbonate ores. Experiments on sulphides have been, however, encouraging. When the sulphur content is above 5 per cent. a preliminary roast is usually necessary before chloride roasting and volatilisation.

The process would doubtless be favourable for use in regions not well supplied with water. All the apparatus required for the construction of a plant are practically standard mechanical devices and machinery. The most important raw materials in operation of a plant are the fuel and the salt

or other halide. In mining districts remote from railways these materials, of course, would be the largest factor in the cost of running a plant. Nevertheless, the cost would often be more than offset by the freight charges on the concentrates and other supplies necessary for a plant using almost any other kind of process.

The experiments described in the bulletin referred to cover part of the investigations carried on by the United States Bureau of Mines, in co-operation with the department of metallurgical research of the University of Utah, on ores from all parts of the United States. Large quantities of different types of ores not amenable to any other process were available, and the method developed gives promise of great commercial importance.

Society of Chemical Industry

Dr. Hele-Shaw's Stream Line Filter

DR. H. S. HELE-SHAW described his stream line filter to a crowded audience of the London Section of the Society of Chemical Industry on Monday, June 4. The filter had previously been described at a meeting of the Royal Society. Its essential points are the employment of one or more packs of impervious material, preferably paper on account of its lightness and cheapness, the pack being held between two parallel ends called press heads, there being also means of controlling the pressure according to the filtration required. Each sheet of the waterproof paper is perforated with an identical number of holes in such a way that the holes lie in alternate rows of large and small holes. When the sheets are put together in a pack—a 150 gallons per hour filter was exhibited containing 4,000 to 5,000 sheets—the holes form tubes. The pre-filt to be filtered is forced in at one end under pressure, and as the opposite ends of the tubes remain closed by reason of the other press head, there is no escape for the liquid except through the interstices of the sheets. The liquid passes through these interstices, leaving behind the matter in suspension in what may be called the inlet or smaller tubes, and passes down the outlet or larger tubes.

Satisfactory Experiments

This is the general principle of the filter, but the demonstration of it, together with demonstrations with one or two smaller filters on a laboratory scale indicated that the claims made for it appear to be justified. Extremely muddy water, a mixture of oil and water, dyes, engine oil and paraffin oil which had been used for cleaning purposes were all treated. The muddy water gave an absolutely clear liquid, the oil and water were completely separated, the impure paraffin oil was also purified, whilst in the case of a sample of Drummer dye, the colouring matter was completely removed and only a pure liquid remained. It was stated by Dr. Hele-Shaw that the cost of renewing the filter paper in the large filter which he exhibited was 3s. or 4s. and only 3d. in the case of the small laboratory filter. At the same time he anticipated a very long life for the filter papers when using any kind of solution, and it is not necessary to use a fresh filter paper when a change of substance has to be made. Even activated sludge has been treated, and there have been suggestions that bacteria should be experimented with.

Originally the filter was designed for the purpose of purifying water for condensing purposes and similar objects, but Dr. Hele-Shaw stated that he brought it before the chemical industry in order to give chemists and chemical engineers an opportunity of working out its possibilities, as he himself had no intention of entering upon the chemical aspect, being content to associate himself with the mechanical engineering side of it. As to the paper used, he confessed that he did not know how it was made, and added that he did not care as long as it suited his purpose. He had happened on this particular paper, the virtue of which was its roughness; a very smooth paper being useless for the purpose. The capacity of the filter depends upon the viscosity of the fluid, the dimensions of the apertures through which filtration takes place, the area of filtering surface, and the amount of hydraulic pressure which can be safely applied to effect the operation. The effect produced is an edge filtration as opposed to a surface filtration, and the process is continuous.

Discussion

There was a good discussion upon the paper, in which various speakers paid tribute to the value of the Hele-Shaw filter. Suggestions of many kinds were made as to the use to which it may be put in the chemical industry, not the least interesting being its possible use in connection with bio-chemistry. Professor J. W. Hinchley suggested that the various possible uses for the filter should be investigated by different works in order to get the best results, and at the same time expressed the view that he did not think the filter would displace ordinary filters but would be another valuable tool in the laboratory by which more definite work could be done especially in relation to colloidal suspensions. The treatment of suspensions of oil and water was also referred to in the discussion as a present-day difficult problem which appeared to be capable of treatment in a better manner in this filter than by present methods. Dr. W. R. Ormandy spoke of its uses in connection with clays and also for bacteria; reference was also made to it in connection with sugar solutions.

In his reply to the discussion, Dr. Hele-Shaw said that a good many other things than those actually mentioned during the lecture had been tried, but a great many matters had yet to be investigated with regard to the possibilities of the filter as regards the possible pressure which could be exerted upon the paper and also the pressure at which the material could be sent through, in relation to substances outside those he had mentioned, viz., coloured water, paraffin and oil, and it was these problems he hoped the chemical engineer would work upon in conjunction with the mechanical engineer.

Theories of Molecular Structure

Lecture by Professor Gilbert Lewis

PROFESSOR DONNAN, in introducing Professor Gilbert N. Lewis, of the University of California, to the audience at University College, London, on Wednesday afternoon, said that Professor Lewis was known for his work on atomic and molecular structure, and was continually working on matters which he (Professor Donnan) did not pretend to understand.

Professor Lewis, in opening his lecture, which was the first of a series of three dealing with the "Structure and Behaviour of the Molecule," said that the question of the nature of valency was *the* problem of theoretical chemistry. There had grown up two rather different conceptions of the nature of the linkage between atoms. There was the idea of an electrical attraction, suggested in the first instance by the work of Davy in splitting up molecules electrolytically, and later by the work of Faraday and others on ionisation. The organic chemist regarded valency as almost a physical bond between the atoms. Neither theory was really applicable to all cases, as had been shown by many workers, Werner in particular.

Professor Lewis then showed some slides of various model atoms which had been proposed to account for their combination as complex molecules. He believed that something on the lines of the Bohr atom in which the electrons had an orbital motion was essential to explain magnetic phenomena, and that something on those lines was the best solution. His own experiments led him to believe that the tendency of free charges to form pairs was the most fundamental characteristic underlying the whole question. Of all the chemical substances known to science there were, until recently, only three in which the number of charges in the molecule (either element or compound) was not even. Some exceptions were NO, NO_2, and these showed somewhat peculiar properties; for instance, NO_2 gas would conduct electricity, showing that the molecules contained unneutralised free charges. Slides were shown of the supposed grouping of "paired" charges for various compounds, and the most remarkable feature was the extreme simplicity and regularity of the arrangement in all cases.

Recovery of Arbitrators' Fees

IN the Mayor's and City of London Court, on June 1, a case as to whether arbitrators can recover their fees was raised in an action before Judge Shewell Cooper, in which Mr. A. J. Barnett, merchant, 90, High Holborn, claimed 10 guineas against the Compagnie Commercial du Nord (Great Britain), Ltd., chemical manufacturers, 54, Gracechurch Street, fee for services rendered as an arbitrator in conjunction with W. T. Bruce in arbitration proceedings between the defendants and Robinson and Watson, of Edinburgh, terminating in an award on October 5. Judgment was given for the plaintiff, with costs.

A System for Harmonising Colours

A Considerable Advance

EVERYONE comes into daily contact with colour whatever his profession or station, and yet its importance as a psychological factor is, perhaps, not fully appreciated. It is indeed remarkable how few of us have any determination of the colour-sense in the solution of harmonious combinations. The study of colour in its various phases has never been developed or pursued to anywhere the same extent, for instance, as the sensation of sound. This has largely been due to the lack of training or education in colour by reason of the absence of a proper instrument for the study of related colours in harmony. Colour is very analogous in many respects to sound and music. The science and art of sound, its harmonies and combinations

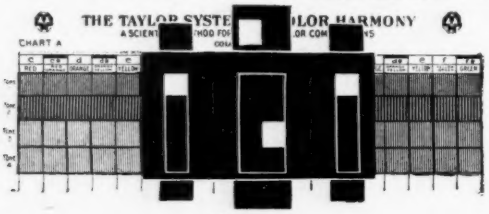

FIG. 1.

have been studied and developed in wonderful detail, and we have numerous instruments which automatically and scientifically determine harmonies in musical notes, and tell us of the possible combinations we may form. Until quite recently, however, there has been no practical and accurate instrument that would enable us to ascertain automatically the combinations of colours that stand in harmony with one another.

There have been many colour-cards or colour-wheels by means of which two colours may be shown in harmony, but the limitations of this method of studying colour harmony are obvious. It provides only one harmonising colour for each colour on the card or wheel and leaves little scope for experiment.

The need of a more flexible and comprehensive system has been felt for a number of years, more especially since modern taste demands a fresher and more spontaneous use of colour. The one decisive step forward in the science of colour harmony, since the discoveries of Chevreul in 1832, was made by Henry Fitch Taylor, ex-president of the American Painters' and Sculptors' Association. Thanks to his research,

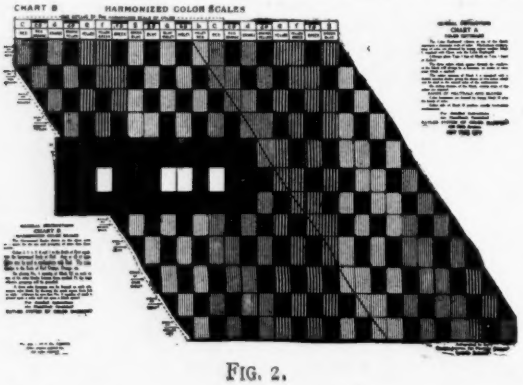

FIG. 2.

the study of colour harmony has at last been delivered from the restraining circle and presented to the world in an orderly and workmanlike manner.

Analogous with Musical Harmony

The principle underlying this system of colour harmony is based upon the application of the laws which govern harmony in music to colour. In fact, the same laws that have been worked out for the octave in musical composition have been transferred in mathematical ratio to the spectrum. Many interesting articles have been written in regard to the relationship between colour and sound, but it is not necessary to possess a knowledge of music in order to use the Taylor Chart.

The apparatus consists of two charts and three masks. Upon a large sheet of heavy plate paper are printed bands of colour arranged in sequence so as to form a chromatic colour-scale, Chart A (Fig. 1), while the second Chart B (Fig. 2) shows a harmonised scale of colours for each separate colour shown on the Chart A. The masks are of black cardboard in which small openings are cut. Mask I. has openings and shutters which allow three colours or three tones, according to the shutter adjustment, to be exposed at one time, and no matter what position the masks are the exposed colours will always harmonise. Masks II. and III. have openings only.

The spectrum band on the colour chart is divided into half-steps of colour. From red to red on the colour keyboard comprises the range of colours in the spectrum, seven pure or whole colours and six blends between them. These thirteen colours constitute one octave of the chromatic scale of colour which corresponds to the chromatic scale in music. Upon this scale either major or minor triads or chords may be formed just as upon the keyboard of a piano. The usefulness of the chart is enhanced by the addition of several bands showing lighter gradations of tones of the spectrum colours, also neutralised, greyed and blended colours in spectrum sequence. Any of the lighter tones of a colour shown in these additional bands can be used as a substitute for the full colour, or the various tones can be used interchangeably without affecting the harmony of the combination, the basis of the several tones of a colour being the same in all cases. Harmonies are formed on the bands of neutrals (Fig. 3), grey neutrals, and blends by applying the mask to each band separately. The three colours showing through the openings simultaneously will be in harmony. Not only are the grey neutrals and blends interesting as combinations among themselves, but they are of especial value for use with combinations formed on the colour keyboard. The advantage of this colour harmony chart as a ready reference, and its improvement in practic-

FIG. 3.

ability and accuracy over the old arbitrary colour-wheel is evident; some 20,000 colour combinations of from 2 to 7 or more colours can be instantly brought before the eye.

The experiments were originally founded on the premiss that the same relation of intervals which produced harmony in musical sound on the musical octave would produce harmony in colour when applied to the spectrum. This premiss has been entirely justified, and the known laws corroborated and greatly supplemented. In every triad or chord of colour produced on the colour harmony chart there will always be found a colour with some form of its complement, and a third colour which serves to strike a balance between the two.

Practical Uses of the Chart

In using the apparatus, the first thing is to locate the base colour either on the colour keyboard or band of neutrals and blends. If the basic colour is not easily discernible the tones should be consulted. Where colours are so neutralised and blended with other colours as to disguise their basis, the bands of neutrals and blends should be consulted for matching, and the vertical lines followed upwards until the pure colours from which they are derived are indicated. When the colour is located No. 1 mask is placed so that the colour shows through either one of the openings, and the colours revealed in the remaining two openings will be found to form a perfect harmony. If it is not desired to employ a colour in its fullest intensity, the shutters of the mask can be employed to expose lighter tones. The provision of shutters enables the operator immediately to visualise the different effects produced by changing their position.

The discovery throws considerable light upon the general subject of colour mixture and combinations, which should be of interest to both the colour chemist and practical dyer. It is the first time that the subject of colour has been presented in an intelligent and sufficiently comprehensive manner to meet the problems of those who have to deal with hundreds of shades.

Chemical and Dyestuff Traders

THE officials of the new Association have issued several documents setting forth the aims of the Association and appealing for further members. In one of the circulars it is stated :

It is generally recognised that the merchant factor is of indispensable importance to such a great overseas trading country as ours. The merchants discover and develop the best sources for raw materials and necessary supplies and find markets for our manufactured articles. It is confidently claimed that selling to and through merchants and agents is the cheapest and, in the long run, the most effective mode of selling by British manufacturers. The merchants lessen unemployment and help the trade of the country by giving preference wherever possible to home productions, and their services and advice are freely at the disposal of Government departments to assist in the restoration of the world-wide trade that has made us the greatest trading nation. For the last three years the chemical and dyestuffs trades of the United Kingdom have been largely controlled by legislation, such as the Safeguarding of Industries Act, 1921, and the Dyestuffs (Import Regulation) Act, 1920. No other trades are restricted to the same extent as are the chemical and dyestuffs trades, and on that account it is imperative that traders should combine to protect their mutual interests.

A Wharfinger Problem

Not long ago, it is stated in the Association's bulletin, certain members of the Association, who were landing goods at a London wharf, had them seized by the wharfingers, who put a general lien of about 75s. a ton on them. This amount was levied to cover the wharfingers in respect of charges alleged to be owing by the shipping company who landed the goods. The amount of the general lien included charges in respect of goods previously landed and cleared. On the suggestion of the Association, who called in legal advice, our members tendered the amounts for charges in respect of their specific consignments. The wharfingers refused this offer and detained the goods. Our members then paid, under protest, the full general lien. The Association then called a meeting of firms interested and invoked the aid of the London Chamber of Commerce Merchants' Committee. The latter body supported us and a guarantee fund was raised to test the legality of the wharfingers' claim. Action was taken in one member's name, and after going through the courts the wharfingers failed to get a decision in their favour and have now agreed to withdraw their demand for a general lien and accept a settlement by payment of the charges in respect of the actual consignments, otherwise " a particular lien."

Briefly, the wharfingers endeavoured to set up a precedent that they were entitled to charge " A " (the importer) with " B's " (the shipping company's) debts in respect of, amongst other things, " C's " goods. If they had succeeded, everyone's goods would have been at the mercy of any shipping company that might have a dispute with wharfingers or become insolvent. Through the action of the Association, supported by the London Chamber of Commerce Merchants' Committee, it has been definitely settled that wharfingers are not entitled to put a general lien on goods they may hold at the moment, when such general lien is for charges owing by a shipping company in respect of other people's goods, etc. They are at the most—this point was not contested—only entitled to demand payment of charges in respect of goods they are holding. This is a typical and good illustration of the protection the Association renders to its members and the trade generally.

Railway Freight Rates

There appear to be many anomalies in the classification of chemicals, etc. For instance, the freight on formic acid is nearly double that on acetic acid, whereas it is considered by some members that the two products should be on the same basis. It is intended to make representation on this question, and we shall be glad if all members will inform the Association of any other products which, in their opinion, are unfairly classified.

Irish Free State Customs

Members are advised that there is heavy delay in clearing goods at the above Customs. The docks are said to be full up, and big consignments are also held up at home ports waiting shipment. The import duties levied appear to vary according to the port of landing and the officer dealing with the consignment, and no information of a reliable nature can be obtained as to what is and what is not liable to duty. Steps are being taken to get the position more clearly defined.

Chemical Matters in Parliament

The Cost of Dyestuffs

Mr. H. Spencer (House of Commons, June 5) asked the President of the Board of Trade whether he was aware that, on March 8, 1923, an application was made to import one ton each of rosazeine B. extra and rhodamine B. extra ; whether permission was refused and the dye user referred to British dyemakers, whether the British price quoted was £1,736 more for the two tons of dyeware ; and whether, in view of the large amount of unemployment caused in the dyeing trade by dear dyewares, he would state what steps he proposed to take to remedy this evil.

Sir P. Lloyd-Greame, in reply, said : " The application to which Mr. Spencer refers was, I understand, made by the British Cotton and Wool Dyers' Association. It was refused by the Dyestuffs Advisory Licensing Committee after full consideration of all the circumstances relating to the particular consignments, and I do not propose to take any action in the matter. I am unable to assent to the proposition that the establishment of a dye-making industry in this country is injurious to employment in the dyeing industry. The former is, on the contrary, essential to the security of the latter."

Mr. Spencer then asked if he did not think that putting a burden of £1,700 on two tons of dyestuffs was one very essential cause of unemployment in the dye industry ?

To which Sir P. Lloyd-Greame replied : " No ; I do not. That is not at all a fair way of putting the case. This, I understand, was decided by the Advisory Committee on which the dyemakers are a minority. I am informed that this was a job lot sent in at a dumped price. I am perfectly certain that if we had not taken steps to establish an effective industry in this country, the results would have been deplorable." (Ministerial cheers.)

Cotton Exports and Dyestuffs

Mr. Spencer (House of Commons, June 5) also asked whether the President of the Board of Trade was aware that the quantity of grey cotton cloth exported increased by 50 per cent. whereas the printed and coloured woven cloth decreased by 38 per cent. in 1922, as compared with 1920 ; that the opinion of the cotton trade was that the cause of this was the prevention by the Government of dyers getting their dyewares at the cheapest world-prices ; and what steps he proposed to take to prevent the decline of the important cotton dyeing and printing industry ?

Sir P. Lloyd-Greame replied that he was aware that, as between the two years quoted, there was a large percentage increase in the exports of grey cotton cloth, and a substantial though smaller percentage decrease in the exports of dyed and printed cloth, but he was not prepared to accept the view that this was due mainly to the prices of dyestuffs. As regards the last part of the question, he pointed out that but for the action taken by the Government to promote the dyemaking industry, the British textile trade would at the present time be very gravely embarrassed.

U.S.A. and German Dye Patents

THE United States Government has brought an action in the Federal Court to set aside the sale of 4,800 German dye chemical patents to the Chemical Foundation. The Government contends that Mr. Polk, the Acting Secretary of State who sold the patents, was deceived by certain interests in the American dye chemical industry into authorising the transaction. It is further contended that the sale was improper also because there was substantial identity of buyers and sellers, several officers of the Foundation having been part of the Alien Property Custodian's forces. The Custodian himself, in fact, became president of the Foundation, and his counsel was made the Foundation's counsel. By the Foundation's charter all the profits over 6 per cent. are supposed to go into research work in chemistry.

From Week to Week

A GENERAL REDUCTION is announced in the prices of borax, both British and American.

THE OFFICES of the Mozambique Portland Cement Co., Ltd., have been moved to No. 1, Broad Street Place, E.C.2.

BARIMAR, LTD., announce that they have removed to larger London premises at 14-18, Lamb's Conduit Street, Theobald's Road, London, W.C.1.

THE INSTITUT FRANÇAIS of South Kensington arranged for the exhibition at the Queen's Hall on Monday of the Pasteur Centenary film.

THE GOVERNMENT EXPLOSIVE STORE and refinery plant at Chester, which seven years ago cost £500,000, has been sold to the Anglo-Scottish Finance Corporation for £30,000.

TULLEY GAS PLANTS, LTD., on Tuesday, issued a prospectus for 200,000 7 per cent. participating preference shares of £1 each, entitled to 20 per cent. of the remaining profits to be distributed in any year.

DR. R. B. MOORE, chief chemist of the U.S.A. Bureau of Mines, has been made a member of the American Philosophical Society of Philadelphia, "in recognition of his services in promoting useful knowledge."

SEVERAL LARGE GERMAN works are paying their dividends in gold marks; in the case of the works of the Dye Trust (Interessengemeinschaft der chemischen Industrie) at the rate of 0·6 marks per 1,000 marks share.

DR. E. W. SCHWARTZE, of the U.S.A. Bureau of Chemistry, has received a medical fellowship from the National Research Council for a year's study with Sir W. M. Bayliss, professor of general physiology at University College, London.

AMONG the papers to be read at the Royal Society on Thursday, June 14, will be one by Mr. O. R. Howell on "The Catalytic Decomposition of Sodium Hypochlorite by Cobalt Peroxide," communicated by Professor T. M. Lowry, F.R.S.

THE PRIVATE RESIDENCE of the late Sir Thomas Barclay (Messrs. Southall Bros. and Barclay, manufacturing chemists) has been converted into a convalescent home for sick children of Birmingham, and Mr. Neville Chamberlain (Minister of Health) formally opened it on Saturday last.

ON THURSDAY, June 14, a lecture will be delivered before the Chemical Society by Professor Charles Moureu, President of the Société Chimique de France, in the Royal Society's Rooms, Burlington House, Piccadilly, entitled "Les Gaz Rares des Sources Thermales, des Grisous et autres Gaz Naturels."

AT THE LAST meeting of the Board of the Institute of Physics the following corporate members were elected:—Fellows: J. H. G. Monypenny, J. H. T. Roberts, R. C. Richards and G. C. Simpson; Associates: A. Adderley, W. T. Astbury, F. G. C. Bratt, P. A. Curry, C. A. R. Foster, A. E. Owen and J. H. Smith.

THE INSTITUTION OF PETROLEUM TECHNOLOGISTS is removing from John Street, Adelphi, to Aldine House, Bedford Street, Strand, London, W.C.2, on Monday, June 25. The offices will be officially closed from 5 p.m., Wednesday, June 20, till 10 a.m., Wednesday, June 27, to enable the change of offices to be carried out.

CLIFFORD, CHRISTOPHERSON AND CO., London, announce that as from June 4 their prices for the "Three Elephant" brand of borax (manufactured by the American Trona Corporation) are reduced to: Commercial granulated, 99·5 per cent. pure, £25 10s. per ton; commercial powdered, 99·5 per cent. pure, £27 per ton, bags free, carriage paid.

IT IS OFFICIALLY ANNOUNCED that at the meeting of the Association of Producers of Chilean Nitrate, held in Valparaiso on June 1, it was unanimously agreed to continue the association until June 30, 1924. The question of the renewal of the association for a period of five years from July 1, 1924, will be considered in due course.

AT THE GENERAL MONTHLY MEETING of the Royal Institution on Monday it was announced that the managers had chosen Sir William Bragg, Professor of Physics in the University of London, to be Fullerian Professor of Chemistry in the Institution and Director of the Davy-Faraday Research Laboratory, in succession to the late Professor Sir James Dewar.

A VERDICT of "Suicide by drowning while temporarily of unsound mind" was returned by the Isle of Wight Coroner at an inquest held on Monday on the body of Victor Hobson Goldthorpe, research chemist, of the British Dyestuffs Corporation, Huddersfield, who was on a visit to Shanklin and who had been missing since May 10. The body was washed up on the foreshore at Shanklin on Sunday morning.

AN EXHIBIT at the International Mining Exhibition which has attracted considerable attention is a tube of radium bromide shown on the stand of the Cornish Institute of Engineers. This has been extracted from Cornish pitchblende from the South Terras Mine by the owners, the Société Industrielle du Radium, and is claimed to be the first specimen of radium salt, apart from ores, shown at a public exhibition.

MR. LEONARD ARCHBUTT, who has for 42 years held the position of Chief Chemist to the Midland Railway at Derby, has retired from the railway service under the age limit. After completing his education at University College School in 1874, he entered the laboratory of the late Mr. A. H. Allen, of Sheffield, as an articled pupil, and at the time of his appointment to the Midland Railway he was Mr. Allen's chief assistant.

MR. CHARLES R. GARDNER, F.C.S., analytical and consulting chemist, of Wigan, has been appointed public analyst for the City and County of Gloucester. From 1906 to 1920 Mr. Gardner was chemist for the Roburite Explosives Co., Ltd., and later he began to practise as an analytical and consulting chemist with offices in Wigan. Mr. Gardner's public appointment at Gloucester will not debar him from continuing his ordinary private practice.

DURING FOURTEEN DAYS the French authorities in the Ruhr have seized dyes worth at least 200,000,000 francs (nominally £8,000,000) and have transported them to Strasbourg. The coup was prepared with the greatest care and secrecy, and all points of the works were occupied by skilled engineers made familiar with the plants, etc., under cover of darkness. The staffs of the factories of Biebrich and Höchst were taken completely by surprise, while those at Lüdwigshafen had only time to bolt.

THE COMMERCIAL SECRETARY at Copenhagen, Mr. R. M. A. Turner, will be in attendance at the Department of Overseas Trade from June 25 to 30 inclusive, and will be pleased to interview, by appointment, United Kingdom manufacturers and merchants interested in export trade to Denmark. Mr. Alexander Simpson, H.M. Trade Commissioner at Sydney, who is now on a visit to the United Kingdom, will be pleased to interview firms interested in trade with Australia, particularly New South Wales, at the Department from June 4 to 9 inclusive. Applications for interviews should be addressed to the Department at 35, Old Queen Street, London, S.W.1.

A GENERAL meeting of the members of the Royal Institution was held on Monday, June 4, the Duke of Northumberland, president, in the chair. It was announced that the managers had elected Sir William Bragg, Fullerian Professor of Chemistry, director of the laboratory, superintendent of the house, and director of the Davy Faraday Research Laboratory. The thanks of the members were returned to Dr. J. J. S. Rowe for his donation of £1 to the Fund for Experimental Research. The secretary reported the death of Professor E. W. Morley, an honorary member of the Institution, and a resoluion of condolence with the relatives was passed. Mr. G. E. Gask, Mr. John Lister, Mr. P. Ainsworth Means, Mrs. Robert Mond, Mr. F. C. Oldfield, Mr. Edward Talbot Paris, Sir Frederick Rice, Mr. C. M. C. Rovsing, and Mr. W. S. Rowntree were elected members.

IN EVIDENCE before the Departmental Committee on the Taxation and Regulation of Road Vehicles, on Monday, Mr. W. Gordon Adam, a technical member of the council of the National Benzol Association, said that circumstances tended at the present time to decrease the production of benzol in this country. A duty on imported benzol of, say, sixpence per gallon, would, he thought, be sufficient to allow some of the plants which had been shut down to restart production. At the present time the total potential home production of benzol was forty-six million gallons annually, but the estimate for the present year was seventeen and a half million gallons. Benzol producers were asking for a slight preferential treatment as compared with petrol producers, but in return the country would obtain an improvement in fuel supply and security in time of need.

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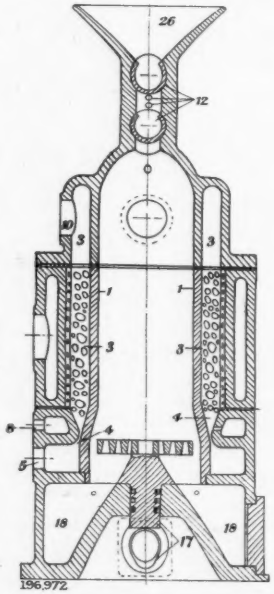
Abstracts of Complete Specifications

196,944. SEPARATING MINERALS MECHANICALLY, PROCESS FOR. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 14, Huxter, Hamburg, Germany. Application date, October 28, 1921.

This process depends upon the fact that if ores are subjected to intensive, high-speed disintegration as described in Specification 155,836 (see THE CHEMICAL AGE, Vol. IV, p. 313), the different constituents are not dispersed in the same way and at the same velocity. If suitable dispersators are employed, the fractionation is accelerated. The dispersator added should possess an electrical charge of the same sign and preferably the same magnitude as the solid ingredient which is more readily colloidalised. The time of colloidalisation is thus reduced without substantial colloidalisation of the other ingredient. In an example, a mixture of zirconia earths finely ground 100 parts, water glass 2·5 per cent. solution 400 parts, and caustic alkali 2 parts, is treated in a colloid mill for 3-5 minutes. The zirconia is colloidalised and the silicates and other impurities may then be allowed to deposit on standing. The zirconium oxide may be subsequently recovered by osmosis or ultra-filtration. Other dispersators such as purified sulphite cellulose liquor with free alkali may be employed. In another example, a finely ground chromium manganese ore is dispersed with a 5 per cent. aqueous cherry gum solution, and a small quantity of alkali. The chromium compounds remain as a coarse suspension which may be allowed to settle, and the manganese compounds are converted into colloidal form. The process is also applicable for the treatment of silver, copper, tin, mercury and manganese-iron ores, and for the recovery of materials such as valuable compounds of tungsten or vanadium, osmium, platinum, palladium, etc. The process may be used in conjunction with a froth-flotation process.

196,972. GAS GENERATORS. F. Umpleby and H. Powers, 24, Tufton Street, Silsden, near Keighley, Yorkshire. Application dates, January 4 and September 26, 1922.

The apparatus is for gasifying carbonaceous materials such as coal, coke, charcoal, vegetable matter, peat, and/or mineral and/or vegetable oils in a retort which is heated by surface combustion. Calcareous materials such as chalk, lime, limestone, etc., which have a catalytic influence at high temperature, may also be added. Solid carbonaceous material and/or calcareous material is fed from a hopper 26 through valves 12 to a retort 1, which is heated by surface combustion which takes place in the external chamber 3 filled with fragments of a refractory material. The combustible gas may be admitted through a passage 4, and may be supplied through an inlet 8 or direct from the retort. Air for combustion is supplied through an inlet 5. The combustion products may be discharged through an outlet 10, or may be passed into the interior of the retort. Carbon dioxide in the combustion products may thus be converted into carbon monoxide. Ash is discharged through the grate into a tank 18, the grate being vibrated by means of a rotating cam 17. A retort for treating liquid or powdered materials is also described, in which the grate is omitted. The quality of gas obtained may be varied by varying the state of sub-division of the material, the temperature, and the time of passage through the retort.



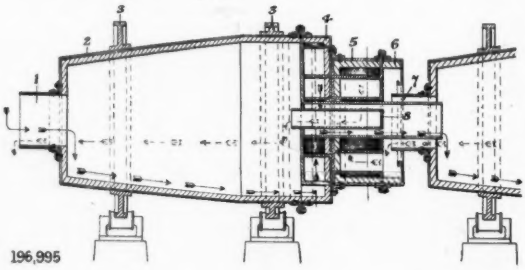
The retort may operate below atmospheric pressure and the gases may be drawn by suction through coolers, purifiers, enrichers, etc. Alternatively, a high pressure may be maintained, due to the liberation of gas from the calcareous material. The retort may be built up from highly refractory material such as fused alumina, silicon carbide, zirconia, fireclays, and/or pellets of metal.

196,993. SULPHURISING ORGANIC COMPOUNDS, PROCESS FOR. F. W. Atack, 21, Spring Gardens, Manchester. Application date, January 31, 1922.

Indo-phenolic bodies are usually sulphurised in the presence of a solvent for the polysulphide, such as water or ethyl alcohol, but it is now found that normal butyl alcohol is particularly suitable as a solvent, since it is less attacked by polysulphides and is miscible with, but easily separated from, water. In an example, the indo-phenol from carbazol and *p*-nitrosophenol is mixed with normal butyl alcohol with or without pyridine, sodium sulphide, and sulphur, and heated to 100° C., and finally under reflux. The product is then diluted with water, the butyl alcohol removed, and the dyestuff separated as usual. Other indo-phenolic substances may be similarly sulphurised.

196,995. LIXIVIATING APPARATUS, MECHANICALLY ACTING. G. Haglund, Falun, Sweden. Application date, January 31, 1922.

The apparatus is particularly for automatically lixiviating ores and includes a conveying device which transports the ore in one direction and the liquor in the opposite direction. The apparatus comprises a series of lixiviating drums, of which one is shown in the illustration. The drum 2 is rotated by means of rollers 3, and the ore is fed in through the opening 1.



The ore travels along the sloping walls to the larger end, which contains a spiral elevator 4. The mixture of ore and liquor is raised by the elevator to a conduit 7, through which it passes to the next drum, where it is treated with less saturated liquor passing in the opposite direction. A cylindrical part 5 also contains a spiral elevator of smaller diameter but greater width than the elevator 4. A projecting cylindrical portion 6 is provided with in-turned edges as shown. The liquor from the second drum flows through the conduit 7 to the elevator 5, which discharges it into the inner conduit 8 as shown by the arrows, and thence into the first drum. To prevent the elevator 4 from becoming filled with liquor before picking up the solid material, it is provided with a valve which is kept closed by a spring during the greater part of the revolution, but is opened by contact with a cam surface when in position to pick up the solid material. The spiral elevators are constructed of or covered with acid-resisting material.

197,033. TRADE WASTE WATERS, PROCESS FOR TREATING TO CLARIFY AND STERILISE THEM AND EXTRACT THE FATS. A. G. de Ræve, 137, Phillip Street, Sydney, Australia. Application date, February 7, 1922.

The process is mainly for recovering wool grease from the waste water obtained in wool washing, and to render the effluent water innocuous. The water is mixed with fresh milk of lime and heated to boiling point for five minutes by means of steam. The amount of lime is sufficient to convert the sodium carbonate in the liquor into caustic soda. Calcium carbonate is precipitated and brings down with it insoluble organic matter, fine mineral matter, and lime soaps produced

by the reaction of the lime with the washing soap. The boiling of the liquor also expels free ammonia. The solid matter is allowed to settle, and the liquor run into another vat. The total quantity of alkali in it is then determined, and sufficient chlorine passed into it to produce chloride and hypochlorite. The sodium hypochlorite acts on the hydrolysed proteins and a quantity of grease is liberated. The temperature should be maintained at about 27° C., and the chlorine may be obtained by electrolysis, in which case sodium chloride is added to the liquor. The proportion of hypochlorite is then determined, and the equivalent amount of acid is added to set free hydrochloric acid and oxygen. About 96 per cent. of the grease is recovered by this method, and the liquor remaining is not liable to decomposition. The recovered grease may be dehydrated by heating and emulsifying it with sodium carbonate solution.

197,069. HYDROCARBONS, PRODUCTION OF. The United Kingdom Oil Co., Ltd., and G. F. Forwood, Mark Lane Station Buildings, London, E.C.3, and J. G. Taplay, 45, Sternhold Avenue, Streatham Hill, London, S.W.2. Application date, February 16, 1922. Addition to 128,255.

Specification No. 128,255 (see THE CHEMICAL AGE, Vol. I, p. 174) describes a process for distilling shale, and cracking and hydrogenating the resulting vapour. In the present process, a retort is filled with shale and heated to a temperature varying from 400° C. at the top to 600° C. at the bottom. Steam is passed into the retort, and the oil distilling at the top is returned with the steam through the spent shale in the lower part. The permanent gas containing hydrogen, which remains after condensing and scrubbing the vapours, is freed from sulphuretted hydrogen and carbon dioxide, and returned to the retort with the steam and oil. The presence of this gas reduces the decomposition of the vapour, and a more effective hydrogenation of the product is obtained. Further, the quantity of steam used is diminished, and less fuel is required to maintain the temperature of the retort. The hydrogenation is also facilitated by admitting steam into the retort at right angles to the stream of oil vapour, at the top of the retort, and at the outlet end of the retort, in opposition to the stream of vapour. The presence of nascent hydrogen in all parts of the retort is thus assured.

197,223. CHROMATE OF SODA, MANUFACTURE OF. E. Baumgartner, Villa "Carmen," Kamstrupsti 6, Roskilde, Denmark. Application date, June 15, 1922.

In the usual process for manufacturing sodium chromate from chrome-iron ore and sodium carbonate, the mixture is heated in a reverberatory furnace, but it is necessary to stir the mixture to prevent consolidation of the sodium carbonate and to ensure access of air. Further, the mixture is exposed to a direct flame, and the presence of large quantities of carbon dioxide may cause the hot gas to have a reducing effect rather than an oxidising effect. In the present process, a mixture of chrome ore, sodium carbonate, and lime is formed into briquettes with about 10 per cent. of water. These briquettes are arranged in a muffle furnace in rows with intervening air spaces to allow access of a current of air to all the briquettes. It is found that the briquettes retain their shape, and that sodium chromate is produced without the necessity of moving them. The lime is not necessary to the reaction, but is added to accelerate the conversion into sodium chromate.

196,952–3–4 and 197,281. CELLULOSE ETHERS, DYEING OF H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, November 30, 1921.

196,952. The process is for dyeing ethers of cellulose, such as the ethyl, methyl or benzyl ethers, in the form of artificial silk or films, with direct cotton dyes or acid dyes. The fact that the hydroxyl groups of the cellulose ethers are blocked by the etherifying groups renders it probable from theoretical considerations that these ethers would present similar difficulties to the cellulose acetates when treated with direct cotton dyes and acid dyes, *i.e.*, that there would be no affinity for these dyes except those which contain active groups (hydroxyl groups amino, imino, imide, nitro, nitroso, isonitroso, acedylamino, and azo groups) and no sulpho groups. It is now found, however, that the insoluble cellulose ethers may be dyed by direct cotton dyes and acid dyes, thus indicating that the question of the hydroxyl groups does not determine their behaviour with these dyes as in the case of cotton. The dyeing may be effected by the usual methods, and either mineral acids or alkalies may be used in the operations owing to the non-saponifiable natures of the cellulose ethers. Detailed examples are given of the dyeing with direct dyes such as Congo red, or diazo fast black, acid dyes such as Nigrosine B, Alizarin Astrol B, Azo yellow 3 G, Rocelline, Orange II.

196,953. The insoluble cellulose ethers have been found to have an affinity for all basic dyes notwithstanding their different chemical character as compared with cellulose ethers, and the dyeing with these dyes may be effected by any usual methods with or without mordants and with or without after-treatment. The term basic dye is intended to include the triphenyl methane class such as magenta, methyl violet, malachite green, etc., or the azine, thiazine, thiazol, or oxazine classes, the acridine class, or the azo colours. Examples of the dyeing are given.

196,954. The process is for dyeing the insoluble cellulose ethers with colours which are produced on the fibre by the interaction of developers and diazotised bases or diazotised dyes, or with dyes which are produced or developed on the material by oxidation of amino bases as aniline blacks, paramine browns, etc. The dyeing may be effected by treating the material with diazotizable bases, rinsing, diazotising, and afterwards coupling with developers such as phenols, amines or their derivatives. The bases may be aniline, toluidines, nitranilines, nitrotoluidines, phenylenediamines, toluylenediamines, naphthylamines, benzidine, tolidine, dianisidine, amidoazobenzene, *o*-amidoazotoluene, *p*-amidophenol, naphthionic acid, *p*-nitro-*o*-anisidine, *m*-nitro-*p*-toluidine, *o*-nitro-*p*-phenetidine, etc. The developers may be phenol, naphthols, resorcine, pyrogallol, ethyl-beta-naphthylamine, and other amines or their derivatives. Examples are given.

197,281. The process is for dyeing the insoluble cellulose ethers with vat dyes such as those of the indigo group, anthraquinone vat dyes, etc. It is found that in spite of the water-repelling nature of the fibres made from these cellulose ethers, they can be dyed by means of vat dyes by the usual methods. An example is given in which a dye vat is made up from indigo paste, hydrosulphite powder and caustic soda lye. The goods are dipped in this vat and the colour developed by oxidation, the goods being then washed with water and hot soap solution.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 171,684 (W. H. Simonson and O. Mantius) relating to reclaiming sludge acid in petroleum refining, see Vol. VI, p. 79; 177,777 (Soc. Chimique de la Grande Paroisse Azote et Produits Chimiques) relating to synthesis of ammonia by hyper-pressures, see Vol. VI, p. 744; 178,842 (Consortium füe Elektrochemische Industrie Ges.) relating to the manufacturr of formaldehyde, see Vol. VI, p. 883; 186,572 (Lefranc et Cie.) relating to the manufacture of butyric and other fatty acids, with recovery of fermentation gases, see Vol. VII, p. 760; 188,662 (Chemische Fabrik Griesheim Elektron) relating to the production of stable compounds of calcium hypochlorite, see Vol. VIII, p. 101; 189,432 (Farbwerke vorm. Meister, Lucius & Brüning) relating to the manufacture of formaldehyde, see Vol. VIII, p. 127.

International Specifications not yet Accepted

195,602. HEXAMETHYLENE-TETRAMINE. Holzverkohlungs-Industrie Akt.-Ges., Constance, Baden, Germany. International Convention date, March 28, 1922.

Methylene chloride is heated with an excess of aqueous ammonia in an autoclave for 15 hours at 100° C. to produce hexamethylene-tetramine. The liberated hydrochloric acid is preferably neutralised by adding also sodium carbonate or caustic alkalies.

195,619. DYEING TEXTILE FABRICS. Textilwerk Horn Akt.-Ges., Horn, Switzerland. International Convention date, April 3, 1922.

Cotton fibre is treated with caustic alkali to form alkali cellulose, and then with an aromatic sulphochloride such as *p*-toluene-sulphochloride, *o*-toluene sulphochloride, or sulpho-

chlorides of benzene, xylene or naphthalene, or chloro, bromo, or nitro derivatives. The cotton is then capable of fixing basic dyestuffs, but is resistant to substantive dyestuffs after treatment with acid. The cotton so treated may be woven with untreated cotton.

195,649. DYES. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, April 3, 1922.

A diazotised aromatic aminothiazole sulphonic acid is coupled with a mixed urea derived from 2 : 5 : 7-animonaphthol-sulphonic acid or a derivative and an acidyl-*p*-arylenediamine or a derivative. As 2 : 5 : 7-acid derivatives, 2 : 5 : 1 : 7-disulphonic acid and 1-chlor-2 : 5 : 7-acid may be used, and suitable acidyl-*p*-arylenediamines are *p*-aminoacetanilide, *p*-aminoformanilide, *p*-amino-oxalylanilide, *p*-aminophenylurea. Derivatives or homologues of these may be used, substituted in the ortho position by chlorine, methyl, or methoxy; 4-amino-2-methoxyacetanilide and 4-amino-acet-1-naphthylamine. Suitable diazo components are dehydro-thiotoluidine disulphonic acid and dehydrothio-*m*-xylidine-*o*-monosulphonic acid.

195,947. AMMONIUM CHLORIDE. Henkel et Cie. and W. Weber, Dusseldorf, Germany. International Convention date, April 4, 1922.

The residual lyes from the ammonia soda process may be evaporated in an iron vessel without corrosion of the iron, if an electric current of 0·1 ampere per square decimetre of surface is passed through it, using the iron vessel as the cathode. The ammonium chloride obtained is not contaminated with iron, even if an iron anode is used.

195,950. SEPARATING GASEOUS MIXTURES BY LIQUEFACTION. Soc. Anon. pour l'Etude et l'Exploitation des Procédés. G. Claude, 48, Rue St. Lazare, Paris. International Convention date, April 4, 1922.

A gas containing hydrogen, such as water gas, is supplied to the outer part of a heat-exchange column E where the more easily solidified constituents are removed as described in Specification 195,598 (see THE CHEMICAL AGE, Vol. VIII, p. 600). The gas passes on through a pipe B to a chamber C and is partly liquefied in rising through tubes F. The liquid passes through a valve G to the space D where it is partly vaporised, and then performs external work in the motor O in expanding to atmospheric pressure. The gas is thus partly liquefied and is passed into the space I to cool the gas in the tubes F, and then through the pipe X to the exchanger E. Hydrogen leaves the tubes F at the top and is expanded into the space J without external work, and finally passes through the pipe X to the exchanger E. In an apparatus for treating illuminating or coke-oven gas, Fig. 2, the gas from an exchanger such as E is passed through the tubes F, and the liquefied constituents pass through a valve G to the lowest space surrounding the tubes F^1. The liquid then passes around the tubes F to the motor O and thence through the compartment I to the exchanger. Gas which is liquefied in the tubes F^1 collects in a vessel P and then passes through the upper compartment surrounding the tubes F^1 to the exchanger. Hydrogen leaving the top of the tubes F^1 may be expanded without external work at the point L or with external work through the pipe X.

FIG.1.

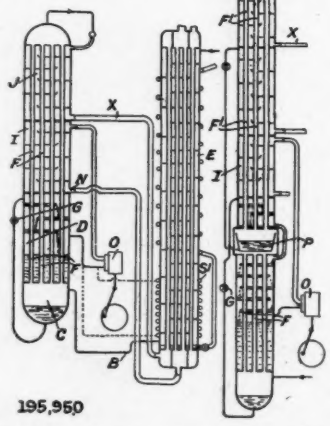
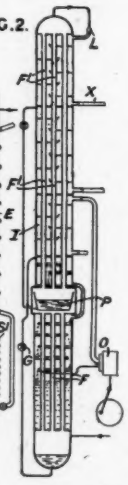


FIG.2.



195,950

LATEST NOTIFICATIONS.

198,332. Manufacture of sulphuric acid. Lamoreaux, W. F. May 29, 1922.
198,376. Electrolytic separation. Rhodin, B. E. F. May 26, 1922.
198,379. Manufacture of new barbituric acid compounds. Chemische Fabrik auf Actien vorm. E Schering. May 29, 1922.

Specifications Accepted, with Date of Application

176,343. Phenylamine black, Production of—and the process of dyeing therewith. C. Aris. March 1, 1921.
183,806. Cellulose acetate, Dyeing of. Soc. Chimique des Usines du Rhone. July 27, 1921.
184,800. Artificial manures, Manufacture of. J. Gradl. August 15, 1921.
187,619. Resins from aldehydes, Manufacture of. Consortium für Elektrochemische Industrie Ges. October 20, 1921.
188,311. Lithopone, Manufacture of. New Jersey Zinc Co. November 2, 1921.
188,632. Dyestuffs capable of being chromed, Process for dyeing wool with. Akt.-Ges. für Anilin-Fabrikation. November 7, 1921.
197,712. Distillation of coal and similar carbonaceous substances. T. M. Davidson and R. H. S. Abbott. January 12, 1922.
197,724. Sulphate of ammonia, Manufacture of. Pease and Partners, Ltd., and G. Stephenson. February 13, 1922.
197,733. Ferro-chromium alloys, Manufacture of. R. Wild and A. H. Wild. February 16, 1922.
197,809. Azo compounds, Preparation of. A. G. Green, K. H. Saunders, and British Dyestuffs Corporation, Ltd. April 5, 1922.
197,845. Sulphur, Method of and apparatus for burning. A. T. Prentice. June 9, 1922.
197,848. Thymol, Manufacture of. Howards and Sons, Ltd., and J. W. Blagden. June 15, 1922.
197,863. Posphorus pentoxide, Manufacture of. Sir R. Threlfall. July 6, 1922.
197,872. Highly exothermic catalytic reactions between gases, particularly catalytic oxidation of ammonia with oxygen, Apparatus for. I. W. Cederberg and H. M. Bäckström. July 14, 1922.
197,887. Electrolytic separation of pure chromium in thick layers, Process for. G. Brewer. (*F. Krupp Akt.-Ges.*) September 28, 1922.
197,898. Alkali thiosulphate, Manufacture of. Rhenania Verein Chemischer Fabriken Akt.-Ges. Zweigniederlassung Mannheim, and F. Rusberg. January 23, 1923.

Applications for Patents

American Shale Reduction Co. and Mond, A. L. Extracting volatile matter from oil-bearing shale, etc. 14,260. May 30.
Ans, J. d', Chemische Fabrik Griesheim-Elektron, and Sommer, F. Production of titanic oxide from titaniferous iron ores. 14,283. May 30.
Ashcroft, E. A. Treatment of lead-zinc sulphide ores, etc. 14577, 14,578. June 2.
Bloxam, A. G., and Chemische Fabrik Griesheim-Elektron. Manufacture of azo dye-stuffs. 14,501. June 1.
British Dyestuffs Corporation, Ltd., Green, A. G., and Oxley, H. F. Separating alkylamines from ammonia, etc., gases. 14,486. June 1.
Brutkzus, M. Process for effecting chemical reactions. 14,268. May 30.
Carpmael, W., and Farbenfabriken vorm. F. Bayer and Co. Manufacture of azo dye-stuffs. 14,273. May 30.
Chemische Fabrik auf Actien vorm. E. Schering. Manufacture of barbituric-acid compounds. 14,079. May 28. (Germany, May 29, 1922.)
Durand and Huguenin Akt.-Ges. Manufacture of highly-chlorinated hydro-aromatic products containing nitrogen. 14,282. May 30. (Germany, May 31, 1922.)
Grasselli Chemical Co. and Marks, E. C. R. Manufacture of concentrated acetic acid. 14,293. May 30.
Green, H., and Wright, C. W. Reduction of oxides and oxy-compounds. 14,013. May 28.
Imray, O. Y., and Soc. of Chemical Industry in Basle. Manufacture of solutions for medical injection. 14,502. June 1.
Jackson, W. J. Mellersh-, and Mathieson Alkali Works, Inc. Electrolytic processes. 14,045. May 28.
Jaques, A. Manufacture of barium sulphate. 14,325. May 31.
Kalle and Co. Akt.-Ges., and Sokal, S. Process of producing perylenetetracarboxylic acids. 14,489. June 1.
Lamplough, F. Distillation apparatus. 14,493. June 1.
Lush, E. J., and Technical Research Works, Ltd. Process for continuous hydrogenation of oils, etc. 14,363. May 31.
Titan Co. Aktieselskabet. Treatment of titanium-nitrogen compounds. 14,508. June 1. (Norway, June 24, 1922.)
Wright, C. W. Reduction of oxides and oxy-compounds. 14,013. May 28.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to* THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, June 6, 1923.

BUSINESS has been moderately active this week, several products in particular being in good demand. Prices on the whole continue steady, and with a firm undertone. The export demand has been distinctly better, and a fair volume of business has been concluded.

General Chemicals

ACETONE has been in fair demand, and the price is without change.

ACID, ACETIC is a shade higher and well called for.

ACID, CITRIC continues in small request, but the price is fairly firm.

ACID, FORMIC has been well called for, and is without change in value.

ACID, OXALIC is inclined to be a shade easier, and demand is small.

ACID, TARTARIC only in small demand, and the price is unchanged.

ARSENIC is not quite so active and foreign material is slightly cheaper.

BARIUM CHLORIDE continues weak and in poor demand.

CREAM OF TARTAR is fairly active and price firm.

FORMALDEHYDE.—Only very small supplies available and price firm.

LEAD ACETATE continues active with quotations very firm.

METHYL ALCOHOL continues in good request and the price is without change.

POTASH, CAUSTIC.—Only in small request without change in value.

POTASSIUM CARBONATE has been in good demand and price unchanged.

POTASSIUM PERMANGANATE is steadier and in better request.

POTASSIUM PRUSSIATE.—Fairly active and price without change.

SODIUM ACETATE is very firm and only in small supply.

SODIUM BICHROMATE.—Unchanged.

SODIUM HYPOSULPHITE.—In fair request and price without change.

SODIUM NITRITE continues weak and in very slow demand.

SODIUM PHOSPHATE.—Quite a good business has been transacted at last-quoted figures.

SODIUM PRUSSIATE.—Very quiet and price easy.

SODIUM SULPHIDE continues easy with keen competition for orders.

ZINC OXIDE.—Unchanged.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID is in good demand, makers' quotations being maintained, and second-hands inclined to accept slightly lower prices.

ACETANILID is a steady market but only in moderate demand.

ACID LACTIC B.P. 1.21 is quiet and easier on the spot.

ACID TANNIC LEVISS tends to become slightly easier.

AMIDOL is in good demand, market being in buyers' favour.

BARBITONE.—Higher prices are asked, stocks are light and difficult to replace.

BROMIDES.—A few second-hand holders are quoting lower prices but makers have maintained their quotations.

CAFFEINE is easier.

EUCALYPTUS OIL.—Continues quiet, but the market is firm and should improve when the demand revives.

METHYL SALICYLATE —Easier, in firm demand.

MILK SUGAR.—Slow, second-hand parcels of questionable quality are offered cheaply from the Continent. Leading makers' quotations are maintained at previous rates.

PHENACETIN firm with an upward tendency.

PHENOLPHTHALEIN remains very firm, stocks are light.

SALICYLIC ACID.—Firm, supplies as they become available from the makers find a ready market.

SODA SALICYLATE.—Steady demand, price unchanged.

SALOL.—Higher prices are being asked for leading brands.

THEOBROMINE PURE.—Lower.

Coal Tar Intermediates

Business during the past week has been rather more interesting and a fair amount of export inquiry continues to be received.

ALPHA NAPHTHOL has been a firm spot and stocks for immediate delivery are practically exhausted.

ALPHA NAPHTHYLAMINE.—Rather more business is reported.

ANILINE OIL is without change.

BETA NAPHTHOL.—Some export inquiry is reported.

DIMETHYLANILINE.—Home buyers are interested.

"H" ACID is without special feature.

NAPHTHIONIC ACID has been rather more interesting.

NITRO BENZOL.—Some small orders are reported.

PARANITRANILINE.—Export buyers are interested.

Coal Tar Products

There has been little fluctuation in prices during the last week.

90 PER CENT. BENZOL is worth 1s. 7d. per gallon on rails.

PURE BENZOL has little fresh business, and is quoted at 2s. 1d. per gallon on rails in the north, and 2s. 4d. to 2s. 5d. per gallon in the south.

CREOSOTE OIL is steady at 8d. to 8¼d. per gallon in the north, and 8¾d. to 9d. per gallon in the south.

CRESYLIC ACID is quiet, and is worth 2s. 1d. per gallon on rails for the pale quality, 97/99 per cent.; while the dark quality, 95/97 per cent., is quoted at 1s. 10d. to 1s. 11d. per gallon.

SOLVENT NAPHTHA is steady at 1s. 4d. per gallon.

HEAVY NAPHTHA is also fairly steady at 1s. 6d. per gallon.

NAPHTHALENES continue to be easier, the cheaper qualities being worth from £7 to £8 per ton; while the better qualities are quoted at £10 10s. to £11 10s. per ton.

PITCH.—The market is unsettled, and very little business is being done. Buyers abroad continue to hold off the market.

Sulphate of Ammonia

There are no new features to report.

[*Current Market Prices on following pages.*]

Claim for Mixing of Chemicals

IN the Mayor's and City of London Court, before Mr. Registrar Dell, on June 1, a claim was made by A. H. Moat, trading as H. Vivian and Co., 29, Mincing Lane, E.C., chemical merchants, against Mr. M. Preston, also known as Alton, trading as the Imperial Enlarging Co., 58, Camberwell Road, for £1 6s. 10d. for chemicals supplied. It was alleged that the chemicals when they arrived were all mixed up and useless. The Registrar said the chemicals had been delivered in August and no complaint was made until March. Plaintiff would have judgment for the amount claimed, which would be payable on June 14, which would allow time for the matter to be contested if defendant chose.

Limestone as a Constituent of Explosives

LIMESTONE, more or less pure, is used in many types of blasting explosives, as it acts as an antacid, state Messrs. C. A. Taylor and W. H. Rinkenbach, assistants of the U.S. Department of the Interior, Bureau of Mines. The form in which it is used ranges from a rather pure calcium carbonate to marble dust containing as much magnesium as calcium. Generally it is used as the only antacid, but sometimes with another antacid, such as zinc oxide. The average dynamite contains less than 1·5 per cent. of calcium carbonate, but special powders have contained as high as 15 per cent. The impurities in limestone are of no practical importance in the manufacture of explosives.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	121	0	0	to	125	0	0
Acid, Acetic, glacial, 99–100%	ton	69	0	0	to	70	0	0
Acetic, 80% pure	ton	50	0	0	to	51	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	88	0	0	to	90	0	0
Boric, commercial	ton	50	0	0	to	55	0	0
Carbolic, cryst. 39–40%	lb.	0	1	8	to	0	1	9
Citric	lb.	0	1	10	to	0	1	10½
Formic, 80%	ton	50	0	0	to	51	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol	ton	41	0	0	to	43	0	0
Lactic, 60 vol	ton	43	0	0	to	44	0	0
Nitric, 80 Tw	ton	27	0	0	to	28	0	0
Oxalic	lb.	0	0	6½	to	0	0	6¾
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst	lb.	0	5	9	to	0	6	0
Salicylic, Technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	5	to	0	1	5½
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	lb.	0	0	4	to	0	0	4½
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	35	0	0	to	37	10	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	68	0	0	to	70	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white powdered	ton	73	0	0	to	75	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	16	0	0	to	16	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	10	0	to	11	0	0
Borax crystals	ton	27	0	0	to	31	0	0
Calcium acetate, Brown	ton	11	10	0	to	12	0	0
Grey	ton	19	15	0	to	20	0	0
Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	100	0	0	to	105	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	27	0	0	to	28	0	0
Cream Tartar, 98–100%	ton	97	10	0	to	100	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	92	10	0	to	95	0	0
Formusol (Rongalite)	lb.	0	2	1	to	0	2	2
Glauber slats, commercial	ton	5	0	0	to	5	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols	gal	0	2	2	to	0	2	3
Iron perchloride	ton	28	0	0	to	30	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	43	0	0	to	45	0	0
Carbonate (White Lead)	ton	45	0	0	to	48	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	39	0	0	to	40	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	7	6	to	4	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	50	0	0	to	55	0	0
Methyl acetone	ton	78	0	0	to	80	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	39	0	0	to	40	0	0
Ammonium sulphate, double salt	ton	39	0	0	to	40	0	0
Potash, Caustic	ton	35	0	0	to	36	0	0
Potassium bichromate	lb.	0	0	5¾	to	0	0	6
Carbonate, 90%	ton	31	0	0	to	32	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	4	to	0	0	4½
Metabisulphite, 50–52%	ton	75	0	0	to	80	0	0
Nitrate, refined	ton	43	0	0	to	45	0	0
Permanganate	lb.	0	0	10½	to	0	0	11
Prussiate, red	lb.	0	3	3	to	0	3	6
Prussiate, yellow	lb.	0	1	4½	to	0	1	5
Sulphate, 90%	ton	10	10	0	to	11	0	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4¾
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3½	to	0	0	3¾
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	1	0	to	0	1	1
Prussiate	lb.	0	0	7¾	to	0	0	8
Sulphide, crystals	ton	10	10	0	to	11	0	0
Sulphide, solid, 60–62 %	ton	16	10	0	to	17	10	0
Sulphite, cryst	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	10	0	to	12	10	0
Roll	ton	11	0	0	to	12	0	0
Tartar emetic	lb.	0	1	2	to	0	1	3
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw	ton	20	0	0	to	21	0	0
Chloride, solid, 90–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	50	0	0	to	52	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	16	0	0	to	17	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	3	to	0	3	6
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	3	to	0	2	9
Salicylic, B.P.	lb.	0	2	2	to	0	2	6
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	9	to	0	8	3
Amidopyrin	lb.	0	13	3	to	0	13	6
Ammon ichthosulphonate	lb	0	2	0	to	0	2	3
Barbitone	lb.	1	2	6	to	1	5	0
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb	0	0	8	to	0	0	9
Potash	lb.	0	0	7	to	0	0	8
Soda	lb.	0	0	7½	to	0	0	8½
Caffeine, pure	lb.	0	11	0	to	0	11	6
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	4	9	to	0	5	0
Chloral hydrate	lb.	0	3	10½	to	0	4	0
Cocaine alkaloid	oz.	0	18	0	to	0	18	6
Hydrochloride	oz.	0	14	9	to	0	15	0
Corrosive sublimate	lb.	0	4	3	to	0	4	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	1	7½	to	0	1	8½
B.P. (75-80% eucalyptol)	lb.	0	1	8½	to	0	1	9½
Guaiacol carbonate	lb.	0	8	6	to	0	8	9
Liquid	lb.	0	9	6	to	0	10	0
Pure crystals	lb.	0	10	3	to	0	10	6
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	3	6	to	0	3	9
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	18	6	to	1	0	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	5	to	0	2	8
Metol	lb.	0	10	6	to	0	11	6
Milk sugar	cwt.	4	10	0	to	4	12	6
Paraldehyde	lb.	0	1	6	to	0	1	9
Phenacetin	lb.	0	6	6	to	0	7	0
Phenazone	lb.	0	7	9	to	0	8	0
Phenolphthalein	lb.	0	6	6	to	0	6	9
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3			—	

	Per	£	s.	d.		£	s.	d.
Resorcine, medicinal	lb.	0	5	6	to	0	5	9
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	9	to	0	3	0
Salol	lb.	0	2	9	to	0	3	0
Soda Benzoate	lb.	0	2	3	to	0	2	6
Sulphonal	lb.	0	14	6	to	0	15	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	10	6	to	0	11	0
Soda salicylate	lb.	0	7	9	to	0	8	3
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9½	to	0	0	10
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	0	to	0	3	3
Benzidine, base	lb.	0	5	0	to	0	5	3
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	7	to	0	1	9
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	9	to	0	4	0
H-Acid	lb.	0	5	0	to	0	5	3
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	2	3	to	0	2	6
Naphthionate of Soda	lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	8	to	0	0	8
Nitronaphthalene	lb.	0	1	0	to	0	1	1
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	9	to	0	6	3
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/10 spot	0	2	0
Bay		0	12	0
Bergamot		0	12	0
Cajaput		0	3	9
Camphor, white	per cwt.	4	0	0
Brown	"	3	15	0
Cassia	dearer and very scarce. No c.i.f. offer; spot	0	9	6
Cedarwood		0	1	6
Citronella (Ceylon)	dearer and scarce	0	3	6
(Java)		0	4	0
Clove		0	7	0
Eucalyptus	firm and scarce	0	1	8
Geranium Bourbon		1	10	0
Lavender		0	12	6
Lavender spike		0	3	0
Lemon		0	3	0
emongrass	per oz.	0	0	2½
Lime (distilled)	dearer and very firm	0	3	9
Orange sweet (Sicilian)	dearer	0	14	0
(West Indian)	dearer	0	10	6
Palmarosa	dearer and very firm	0	19	0
Peppermint (American)		0	13	0
Mint (dementholised Japanese)	dearer	0	6	9
Patchouli		1	12	0
Otto of Rose	per oz.	1	4	0
Rosemary		0	1	8
Sandalwood		1	6	0
Sassafras		0	5	0
Thyme	2/6 to	0	8	0
Synthetics.				
Benzyl acetate		0	3	0
Benzoate		0	3	0
Citral		0	10	0
Coumarine	dearer	0	17	0
Heliotropine		0	7	6
Ionone		1	5	0
Linalyl acetate		1	2	6
Methyl salicylate	easier	0	2	6
Musk xylol		0	9	0
Terpeniol		0	3	1

The Chile Nitrate Market

MESSRS. HENRY BATH AND SON, LTD., in their monthly report on nitrate of soda, dated May 31, say :—

"Deliveries from European ports during May amounted to only about 75,000 tons, compared with 108,000 tons a year ago. The consumption has undoubtedly been affected by the strike in Belgium, and especially by inclement weather; but it is quite likely that the June-July consumption may make some amends. The poorness of demand from consumers has been reflected in the value of floating nitrate, which for near arrival has changed hands from £12 5s. down to about £11 16s. 6d. c.i.f.

"The fixing, on the 3rd inst., by the Nitrate Producers' Association of prices for forward delivery was well received by the market, and up to date rather more than 500,000 tons have been disposed of. The quantities offered for July, August, and September delivery are already completely sold, and 20s. 1d. per metric quintal is now asked by the association for delivery in any position between second half June and first half October.

"Although prices have been fixed for delivery during next January-June, no quantities can be offered in that position pending the prolongation from January 10 to June 30, 1924, of the Nitrate Producers' Association. It is confidently expected that unanimity among producers will be reached at a meeting to be held in Valparaiso on June 1. Association sales for delivery f.a.s. Chile during the current nitrate year, which terminates on June 30, now exceed 2,000,000 tons. The large business for forward delivery f.a.s. Chile contrasts with very few transactions on c.i.f. conditions, the value of July-September shipment by liner for the Havre-Hamburg range being about £11 12s. 6d. to £11 15s. c.i.f.

"It is uncertain to what extent the export licence for German nitrogen has yet been availed of. There have been rumours of about 10,000 tons being sold, but the prospects of an exportable surplus cannot fail to be very considerably modified by the recent seizure of the works at Ludwigshafen and Oppau by the French. Russia is understood lately to have bought a few thousand tons of Chilean nitrate for transhipment from Hamburg."

French Nitrate Consumption

A REPORT by the American Consul at Calais on the French agricultural need for nitrates states that last year France used 126,400 metric tons of sulphate of ammonia, of which 30,500 tons were imported from Germany, 37,500 tons from England, 5,000 tons from the Saar, and 2,000 tons from Belgium. The remaining 51,400 tons were manufactured in France. In addition France imported 260,000 tons of sodium nitrate and 10,000 tons of Norwegian calcium nitrate and manufactured 12,000 tons of cyanamide. These figures translated into terms of nitrate give approximately 69,000 metric tons, or about the pre-war figure (71,000 metric tons). Importation during the year reached a value estimated at 300,000,000 francs and amounted to about 82 per cent. of the total consumption.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, June 6, 1923.

BUSINESS during the past week has been fairly quiet, and there is nothing of importance to record.

Continental offers continue numerous and are, if anything, lower than last week.

Industrial Chemicals

ACID, ACETIC.—Glacial 98/100%, £61 to £7 0 per ton; 80% pure, £49 to £50 per ton; 80% technical, £47 to £49 per ton, c.i.f. U.K. ports.

ACID BORACIC.—Crystal or granulated, £50 per ton; powdered, £52 per ton, carriage paid U.K. stations.

ACID CARBOLIC.—Ice crystals now quoted 1/5½d. per lb.

ACID FORMIC, 80%.—Unchanged at £51 per ton, ex works.

ACID HYDROCHLORIC.—6/6d. per carboy, ex works. In little demand.

ACID OXALIC.—Offered at 6¼d. per lb., ex store.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, £1 per ton more.

ACID TARTARIC.—Price about 1/3¾d. per lb., ex wharf, early delivery.

ALUM, LUMP POTASH.—Moderate inquiry. Spot lots about £12 15s. per ton, ex store. Offered at £11 10s. per ton, f.o.b. U.K., for export.

AMMONIA ANHYDROUS.—Unchanged at 1/6d. per lb., ex station.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground, 4¼d. per lb., delivered.

AMMONIA LIQUID, 880°.—Unchanged at 3½d. per lb., delivered.

AMMONIA MURIATE.—Galvanisers, grey quality, £32 to £33 per ton. Fine white crystals quoted £26 10s. per ton, ex wharf.

AMMONIA SULPHATE.—25¼%, £15 10s. per ton; 25¾% neutral, £16 13s. per ton, ex works in buyers' own vehicles, prompt delivery.

ARSENIC, WHITE POWDERED.—Moderate export inquiry. Quoted about £75 per ton.

BARIUM CARBONATE 98/100%.— Offered at £16 10s. per ton, ex wharf.

BARIUM CHLORIDE 98/100%.—Now offered from Continent at £12 5s. per ton, c.i.f. U.K.

BARYTES.—Finest white English, £5 5s. per ton, ex works.

BLEACHING POWDER.—£11 7s. 6d. per ton, ex station, spot delivery; contracts 20s. per ton less. Offered from Continent at £9 2s. 6d. per ton, c.i.f. U.K.

COPPERAS, GREEN.—Unchanged at about £2 10s. to £2 15s. per ton, f.o.b.

FORMALDEHYDE 40%.—£90 to £91 per ton, now asked for spot lots. Quoted £89 per ton, ex wharf early delivery.

GLAUBER SALTS.—Fine white crystals offered at £3 15s. per ton, ex store.

LEAD, RED.—English make unchanged at £41 per ton, carriage paid U.K. Italian material about £35 5s. per ton, ex store.

LEAD ACETATE.—Little spot material available. White crystals £43 to £44 per ton, brown about £40 to £41 per ton.

MAGNESITE.—Ground calcined English make £8 10s. per ton, ex station.

MAGNESIUM CHLORIDE.—Offered for prompt shipment from Continent at £1 17s. 6d. per ton, c.i.f. U.K. Spot lots about £3 per ton, ex store.

MAGNESIUM SULPHATE (Epsom salts).—Commercial crystals, £7 per ton, B.P. quality, £8 10s. per ton; Continental commercial crystals offered at £4 per ton, ex wharf.

POTASH, CAUSTIC.—Offered at £29 10s. per ton, c.i.f. U.K. Spot lots about £33 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE.—96/98% offered at £28 10s. per ton, c.i.f. U.K.; 90/92%, £26 per ton, c.i.f. U.K. Spot lots, about £32 and £27 10s. per ton respectively.

POTASSIUM CHLORATE.—Crystals or Powdered, quoted 3d. per lb., ex store.

POTASSIUM NITRATE (Saltpetre).—In little demand; prices about £32 per ton, ex store.

POTASSIUM PERMANGANATE.—B.P. Crystals offered at 10¾d. per lb., ex store.

POTASSIUM PRUSSIATE (Yellow).—Spot lots about 1s. 4¾d. per lb., ex store. Offered at 1s. 4d. per lb., ex wharf, early delivery.

SODA, CAUSTIC.—76/77%, £21 7s. 6d. per ton; 70/72%, £19 17s. 6d. per ton; 60/62%, broken, £21 2s. 6d. per ton; 98/99% powdered, £24 15s. per ton, all ex station, spot delivery.

SODIUM ACETATE.—Inclined to be higher at £25 per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 16s. per ton, ex quay or station.

SODIUM CHLORATE.—Offered at 2¾d. per lb., ex wharf.

SODIUM HYPOSULPHITE.—Commercial crystals offered at £8 5s. per ton, c.i.f. U.K. Spot lots about £9 15s. per ton, ex wharf. Pea crystals quoted £15 10s. per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality, £13 7s. 6d. per ton, f.o.r. or f.o.b. U.K.

SODIUM NITRITE, 100%.—Now quoted £26 10s. to £28 10s. per ton, according to quantity.

SODIUM PRUSSIATE (YELLOW).—Offered at 7¼d. per lb., c.i.f. U.K. Spot lots about 8d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE 95%).—£4 per ton, ex station for home consumption. Higher prices for export.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1/4d. per lb.

ZINC SULPHATE.—English white commercial, £14 per ton; Continental about £12.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Large export demand. Price 1s. 6½d. per lb. f.o.b. U.K. port.

ANILINE OIL.—Large export inquiry. Price quoted 11½d. per lb., drums included, f.o.b.

BENZALDEHYDE.—Small inquiries. Price quoted, 3s. per lb. delivered.

BENZIDINE BASE.—Extensive inquiry for export. Price quoted, 6s. 6d. per lb. 100% basis.

BENZOIC ACID.—Good demand for home and export trades. Price, 2s. 3d. per lb. delivered, or f.o.b.

CLEVES ACID.—Export inquiry. Price quoted, 3s. 11d. per lb. 100% basis, f.o.b.

CHROMOTROPE ACID.—Large export inquiry. Price quoted, 10s. 3d. per lb. f.o.b., casks included.

DIMETHYLANILINE.—Export inquiries. Price quoted, 3s. 1d. per lb. f.o.b., drums included.

GAMMA ACID.—Large export inquiry. Price quoted, 12s. 8d. per lb. 100% basis, f.o.b.

"H" ACID.—Large export inquiry. Price quoted, 5s. per lb. 100% basis, f.o.b.

PARANITRANILINE ORTHO SULPHONIC ACID.—Export inquiry. Price, 5s. 3d. per lb. 100% basis, f.o.b.

PHTHALIC ANHYDRIDE.—Export inquiry. Price, 2s. per lb. f.o.b.

SULPHANILIC ACID.—Home inquiries. Price quoted, 11d. per lb. 100% basis, carriage paid.

British Chemicals for Algeria

H.M. CONSUL-GENERAL at Algiers states that, in his opinion, some good service might be rendered to British trade by the supply of catalogues of certain manufactures, including heavy chemicals.

United Kingdom firms interested may obtain on application to the Department of Overseas Trade (Room 84), 35, Old Queen Street, London, S.W.1, the name and address of the concern to whom catalogues should be addressed. The consul points out that catalogues should, if possible, be printed in French. (Ref. 10761/F.E./G.P.)

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, June 7, 1923.

Although business on the chemical market has been slightly more active during the last few days, the general condition is still quiet. As before the major portion of the business that has been done, both on account of home consumers and for shipment, has been in respect of the leading "bread-and-butter" lines of heavy chemicals. Of the home-consuming industries the Lancashire cotton trade is still the weak spot, the continued short-time working having an appreciable effect upon the quantity of textile chemicals going into consumption. Meanwhile prices generally are steady, with here and there a fractional weakening or strengthening of quotations.

Heavy Chemicals

Buyers of caustic soda, both for home and export, continue to take steady supplies; home consumption prices are firm at from £19 for 60 per cent. to £21 10s. per ton for 76–77 per cent. material. Rather good business is also being done in bleaching powder, which remains steady at £11 7s. 6d. per ton. Soda crystals are unchanged at £5 5s. per ton delivered, but the market is inactive. Saltcake is firm and in fair demand at £4 10s. per ton. There is little movement in sodium sulphide and prices are on the easy side at £14 10s. per ton for 60–65 per cent. concentrated solid and £9 per ton for crystals. Glauber salts are still quiet but steady at £4 per ton. Bicarbonate of soda is without change in position or value at £10 10s. per ton delivered to home users. Alkali is in steady demand for both branches of trade; prices to domestic consumers are firm at £7 12s. 6d. per ton for 58 per cent. material. Hyposulphite of soda is rather featureless, although prices are steady at £15 per ton for photographic crystals and £10 for commercial. Nitrite of soda is rather scarce and firm at £27 per ton. Phosphate of soda is a dull section of the market at £14 per ton. Chlorate of soda meets with a fair demand and at 2¾d. per lb. the price is unchanged. Prussiate of soda is slightly weaker again at 7¼d. per lb., without much business being put through. Bichromate of soda is steady and in fair inquiry at 4¼d. per lb. Acetate of soda keeps firm and in good demand at £24 10s. to £25 per ton.

Caustic potash and carbonate of potash are about unchanged from last week. Caustic is steady at £32 to £33 per ton for 88–90 per cent., with carbonate firm and in steady inquiry at £32 per ton for 96–98 per cent. material and £29 for 90–92 per cent. Bichromate of potash is in rather good demand at 5¾d. per lb. Yellow prussiate of potash is easier at 1s. 3½d. per lb., with only a small amount of business being done. Chlorate of potash is steady at round 3d. per lb. Permanganate of potash is being steadily called for with price firm at 9¾d. per lb.

Sulphate of copper is only moderately active on export account, though prices are maintained at between £25 10s. and £26 per ton f.o.b. Arsenic is steady at about £75 per ton for white powdered, Cornish makes, with supplies of foreign material being offered at below this figure. Commercial Epsom salts are in steady inquiry at £6 per ton for British makes; magnesium sulphate, B.P., is firm at £7. Acetate of lime is still in short supply with prices firm; grey is quoted at £22 and brown at £11 per ton. Nitrate of lead is quiet but steady at £42 to £43 per ton. Sugar of lead is well held at £43 per ton for white and £42 for brown.

There is a quietly steady demand for tartaric acid which is unchanged in price at 1s. 3½d. to 1s. 4d. per lb. Citric acid, B.P., crystals, is firm and in moderate inquiry at 1s. 9d. per lb. Acetic acid is still quoted at £70 for glacial and £48 per ton for 80 per cent. technical, prices being strong and demand steady. Oxalic acid is quiet at 6d. to 6¼d. per lb.

Coal tar products generally are on the quiet side, and in some cases prices show a slightly easier tendency. Pitch is nominally quoted at between £6 and £6 10s. per ton f.o.b. Manchester. Carbolic acid crystals are still on offer at 1s. 5d. per lb. crude, 60 per cent., being quoted at 3s. 6d. per gallon. Benzol is quiet but unchanged at 1s. 7d. per gallon. Solvent naphtha is only in moderate demand at 1s. 6d. to 1s. 7d. per gallon. Creosote oil is weaker at 8¾d. per gallon. Naphthalene of all grades are well maintained; flake is on offer at £20 to £21 and crude at £8 to £14 per ton.

The Position of Natural Nitrate

At the meeting of the Lautaro Nitrate Co., Ltd., on Tuesday, the chairman, Mr. Jorge O. Herrera, said the outlook for the industry was bright, and described the fusion with the Lastenia Co. as well balanced. The artificial nitrogen fertilisers had only temporarily succeeded in replacing the Chilean nitrate. The continued use of artificial nitrogen required a greater use of Chilean nitrate, as had been revealed in Germany. Personal investigations in that country last year allowed them to obtain some valuable data. They were informed from reliable sources that the German necessities of nitrogenous fertilisers amounted to the equivalent of 4,000,000 tons of Chilean nitrate. The manufacturers of sulphate of ammonia, cyanamide, and synthetic nitrate, working at full capacity, and after completion of all projected plant in course of development, would only be able to supply half of this necessity. That would mean a shortage of 2,000,000 tons. Germany's pre-war consumption of Chilean nitrate was 800,000 tons, and, on inquiring as to this startling increase in calculated consumption, they were informed that this had to be attributed to two causes: (1) The exclusive use during the war of artificial fertilisers, which have proved detrimental to the soil; (2) the clever and able propaganda work of the Stickstoff Syndicate.

He had never heard a similar compliment paid to their propaganda. Their advertising system had this in its originality: that it was invisible in its action and invisible in its result. London was the centre of their propaganda offices, and, curiously enough, the United Kingdom was perhaps the only consuming country where consumption showed a considerable decrease. There seemed to be no doubt that their propaganda methods would have to be revised and duly modified.

It was also decided unanimously at an extraordinary meeting following the general meeting to transfer the headquarters of the amalgamated companies to Valparaiso.

Aikman's Nitrate Report

Messrs. Aikman (London), Ltd., in their fortnightly report on nitrate of soda, dated June 4, say:—The arrivals amount to about 38,000 tons, and about 15,000 tons are due during the next fortnight.

The European market has been quiet for spot delivery, and with demand retarded owing to the bad weather (and in the case of Belgium the general strike), prices have ruled easier and a few steamer lots due to arrive were sold at £12 3s. 9d. down to £11 17s. 6d per ton c.i.f. Deliveries have also been interfered with, and those for May only reached 83,000 tons, against 109,000 tons last year. An unusually late demand is, however, looked for, owing to the severe check that has been caused to vegetation by the cold weather, and a considerable increase in June and July deliveries is expected. As no fresh supplies are likely to be available before late June shipment—*i.e.*, early August arrival—stocks at the end of July are likely to be reduced to a minimum.

A fair business is reported in liner parcels for June/July shipment at £11 12s. 6d., October £11 17s. 6d. and in July/August sailing cargoes at £11 15s. to £11 17s. 6d. per ton c.i.f. Hamburg. Several cargoes for outports were also sold on private terms at relatively higher prices. At the close the market is firmer, with a better demand for spot owing to the improvement in the weather and the ending of the strike in Belgium, and the renewal of the Producers' Association to June 30, 1924, has also resulted in a considerable demand for forward positions. Closing values are about £11 17s. 6d. for due, £11 12s. 6d. to £11 15s. June/July shipment, £11 15s. to £12 August/October, and £12 2s. 6d. to £12 7s. 6d. per ton c.i.f. for November/January shipment. A considerable quantity of refined for June/July delivery is reported sold to Russia at the parity of £12 7s. 6d. to £12 10s. per ton c.i.f. Antwerp and Hamburg from where it is being transhipped.

A Talk on European Trade

Sir Ernest Benn has arranged to give a talk on European Trade from the London Station of the British Broadcasting Co. on Friday, June 22, at 9 p.m.

Company News

LEVER BROTHERS, LTD.—The register of share transfers will be closed from June 18 to June 30, both days inclusive.

SHAWINIGAN WATER AND POWER CO.—A dividend of 1¾ per cent. for the quarter ending June 30 is announced, payable on July 10.

ANACONDA COPPER MINING CO.—A dividend is announced at the rate of 75 cents. per share, payable on July 23. No dividend was paid last year.

JOSEPH NATHAN AND CO.—The directors have declared a dividend of 3½ per cent. on the "A" 7 per cent. preference shares for the past half-year. Dividend warrants will be posted on June 30.

CONSETT IRON CO.—The directors have declared a dividend at the rate of 5 per cent. per annum on the ordinary shares for the nine months ended March last. For the previous year 4 per cent. was paid.

"SHELL" TRANSPORT AND TRADING CO.—The directors announce a dividend of 2s. 6d. per share, free of tax, payable on July 8 to holders on the register June 6, making 22½ per cent. for the year ended December 31, 1922.

WALL PAPER MANUFACTURERS.—The directors have decided to pay an interim dividend of 4 per cent. in respect of the current financial year on the ordinary shares of the company. The warrants will be posted to shareholders on June 30.

THE TATA IRON AND STEEL CO., LTD.—It is announced that with a view to payment of interest due on the 7 per cent. sterling first mortgage debenture stock on July 1 next, the transfer books will be closed from June 9 to June 30, both days inclusive.

TULLY GAS PLANTS, LTD.—The subscription lists for the offer of 200,000 7 per cent. participating preference shares of £1 each at par, recently made by the company, were closed on Wednesday. Country applications received by first post on Thursday were considered.

BROKEN HILL SOUTH.—For the four weeks ended June 2, 15,440 tons of crude ore and 9,729 tons of dump slime were treated and produced 4,826 tons of leady concentrates assaying 51 per cent. lead and 23 oz. silver per ton; also 2,643 tons of zinc concentrates assaying 43 per cent. zinc.

LASTENIA NITRATE CO.—The net profit for the year 1922 was £280,861, making available, with £44,971 brought in, £325,832. A sum of £150,000 was absorbed by the dividend paid in March last; £25,000 is carried to future development fund; £14,043 to reserve; leaving a balance of £136,788 to be carried forward.

CHILEAN NITRATE PRODUCERS.—At a general meeting held in Valparaiso on June 1, it was unanimously agreed to prolong the Association of Producers of Chilean Nitrate until June 30, 1924. The question of the renewal of the Association for a further period of five years from July 1, 1924, will be considered in due course.

THE INTERNATIONAL NICKEL CO.—The annual meeting of the stockholders will be held at the office of the company, at Oak Street, Bayonne, New Jersey, on Tuesday, June 19, for the purpose of electing five directors to hold office for three years and for the transaction of such other business as may come before the meeting.

"SANITAS" CO.—The profit for the year ended March 31 last, including the balance brought in, amounts to £31,295. The directors recommend a final dividend of 5 per cent., free of tax, on the ordinary shares, making 11 per cent. for the year, against 4½ per cent. for the previous year. A balance of £2,143 is carried forward.

MAZAPIL COPPER CO.—The accounts for 1922 show a loss for the year of £61,307 (against a loss of £89,228 in 1921), from which must be deducted a credit balance of £11,874 brought forward, leaving an adverse balance to be carried forward of £49,432. The report states that the average price of copper in New York for the year was 13·328 cents. per lb., whereas the present price is 17 cents. The directors state that there was a book loss of approximately £20,000 due to the stocks at the end of the year being converted into sterling at an appreciated rate of exchange as compared with the stocks at the beginning of the year.

PREMIER OIL CO., LTD.—The report for the two years to March 31 last states that the revenue account shows a credit balance of £9,945. In accordance with the forecast made by the directors at the meeting on December 29 last, it is proposed to arrange for a first cash distribution of 1s. per share by reducing the nominal value of the issued shares to 4s. It was hoped to make a larger return of capital, but the conditions which followed the French occupation of the Ruhr and the consequent decline in Continental exchanges rendered it impossible to conclude business on a basis which the directors could adopt. It is, however, the policy of the board ultimately to effect a further reduction of capital to 2s. 6d. per share, and to make an additional cash distribution of 1s. 6d. per share as and when this is practicable.

BURMAH OIL CO.—The report for the year to December 31 last shows that all fields expenditure other than of a purely capital nature has been charged direct to revenue. The profits for the year, after charging income tax, contribution to employees' provident fund, directors' fees, etc., and writing off £149,806 for depreciation, amounted to £2,115,823, to which is added £205,814 brought in, making £2,321,637. There have been transferred to insurance reserve £20,000, and to general reserve £200,000. The preference dividends and the interim dividend on the ordinary shares absorbed £736,358, leaving £1,365,279. The directors recommend a final dividend of 4s. per share, free of tax, making 30 per cent. for the year, free of tax, carrying forward, subject to corporation profits tax, £335,062. Depreciation, the report states, has been fully provided for; £64,935 has been written off refineries account, £20,000 off the pipe-lines account, and £64,871 off tankers and tank account. The profit for the previous year, after charging fields expenditure and depreciation, amounting together to £1,247,688, and allowing for income tax and all charges, was £1,902,790. A similar dividend was paid.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Vienna.....	Chemicals, drugs, tanning materials, oils, and fats.	718
Nantes.....	Oils and fats for soap-making, acid oils, and sulphate of copper.	722
Berlin	Animal or vegetable waste fat originating from margarine factories or oil refineries.	F.W. 18905.
Rotterdam	Heavy chemicals.	730

"Chemical Age" Inquiry List

The following inquiries have been received from readers of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bouverie Street, London, E.C.4, will be forwarded to the inquirers.

Manufacturers of Sulphite Cellulose Extract Spruce—No. H 23.

Suppliers of Steatite or Lump Talc.—No. H 24.

Tariff Changes

FRANCE.—Certain chemical products, including commercial acetate of alumina, chloroamido phenols, compressed gases, and colloidal sulphur as reclassified for customs purposes. Particulars may be obtained from the Tariff Section, Department of Overseas Trade, 35, Old Queen Street, Westminster, S.W.1.

IRAQ.—Import duties on oils, certain products containing spirit have been increased.

THE BRITISH ALIZARINE COMPANY LTD.

Manchester London Glasgow

Manufacturers of Alizarine Dyestuffs

ALIZARINE RED (all shades)

ALIZARINE BLUES (soluble and insoluble)

ALIZARINE BORDEAUX

ALIZARINE CYANINE

ALIZARINE GREEN (soluble and insoluble)

ALIZARINE ORANGE

ALIZARINE RED S. POWDER

ALIZARINE BLUE BLACK

ALIZARINE (MADDER) LAKES (of all qualities)

ALIZARINE MAROON

ALIZUROL GREEN (Viridine)

ANTHRACENE BROWN

ALIZANTHRENE BLUE

ALIZANTHRENE BROWN

ALIZANTHRENE YELLOW

Other fast colours of this series in course of preparation

Anthraquinone, Silver Salt and all intermediates of this series

---

CHROME TANNING and other Chrome Compounds

TELEPHONES
663 Trafford Park, MANCHESTER
560 EAST LONDON
2667 DOUGLAS, GLASGOW

TELEGRAMS
BRITALIZ MANCHESTER
BRITALIZ LONDON
BRITALIZ GLASGOW

All communications should be addressed to

The British Alizarine Co., Ltd.

Trafford Park, Manchester

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

CARLTON DYEING AND BLEACHING CO., LTD., Mar Hill Road, Carlton, dyers and bleachers. (C.C., 9/6/23.) £18 12s. 8d. April 20.

ROWLING, William John, 18, Arthur Street, Plumstead, agricultural chemist. (C.C., 9/6/23.) £37 os. 10d. April 25

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

CLEMENT AND JOHNSON, LTD., London, W.C., chemists. (M., 9/6/23.) Registered May 26, £500, £200, £200, £300 £100, £200, £700, £200, £200, £100, £100 and £200 debentures part of £60,000; general charge. *£38,700. January 12, 1923.

HUNTER (CHARLES) AND CO., LTD., Liverpool, manufacturers of polishes. (M., 9/6/23.) Registered May 22, £1,000 debentures (filed under sec.93 (3) of the Companies (Consolidation) Act 1908), present issue £875; general charge.

INDUSTRIAL CHEMICAL CO., LTD., London, E.C. (M., 9/6/23.) Registered May 16, £500 further charge, to F. J. Williams, 15, Devonshire Square, E.C., solicitor; charged on hereditaments at Frog Island, Rainham (Ex.). *——. June 28, 1922.

LION ESSENCE AND CHEMICAL CO., LTD., Brighton. (M., 9/6/23.) Registered May 28, £50 debentures part of £1,000; general charge. *£450. September 30, 1922.

TAYLORS' DRUG CO., LTD., Leeds. (M., 9/6/23.) Registered May 16, £1,500 mortgage, to T. Waide, Applegarth House, Woodlesford, printer; charged on 230, Dalton Road, Barrow-in-Furness. *£74,796 os. 3d. January 3, 1923.

WOODCLIFF, LTD., London, W., manufacturers of silver cleaning preparation. (M., 9/6/23.) Registered May 23, £1,000 debentures balance of £3,000; general charge.

Satisfactions

CORBYN, STACEY AND CO., LTD., London, E., chemists (M.S., 9/6/23.) Satisfaction registered May 24, al. moneys, etc., registered June 16, 1921.

DORSET PERFUMERY CO., LTD. (late RIVERS HILL AND CO., LTD.), Poole. (M.S., 9/6/23.) Satisfaction registered May 30, £1,600, part of amount registered February 23, 1909.

MILLBAY SOAP AND NEW PATENT CANDLE CO., LTD. (late NEW PATENT CANDLE CO., LTD.), Plymouth. (M.S., 9/6/23.) Satisfaction registered May 26, £9,000, registered September 30, 1908.

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Company Winding Up Voluntarily

BALTIC BASIC SLAG CO., LTD. (C.W.U.V., 9/6/23.) William Robson Boyd, 67, Cleethorpe Road, Grimsby, chartered accountant, appointed liquidator.

Bankruptcy Information

MYER, Robert Henry, carrying on business as THE ROSS SUPPLY CO., 186, Wandsworth Road, S.W.8, manufacturing perfumer. (R.O., 9/6/23.) Receiving order, May 31. Debtor's petition. First meeting, June 19, 12.30 p.m.; and public examination, October 19, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

Partnership Dissolved

PARKER AND SANDERSON (Edward PARKER and William Ewart SANDERSON), chemists and druggists, 29, Ramshill Road, Scarborough, by mutual consent as from April 5, 1923. Debts received and paid by W. E. Sanderson, who will continue the business.

New Companies Registered

APEX CHEMICAL CO., LTD., 39, Heath Mill Lane, Birmingham. Chemists, druggists, importers, manufacturers and refiners of and dealers in all kinds of metallic and non-metallic substances. Nominal capital, £1,000 in £1 shares.

C. J. CHAPMAN, LTD. Manufacturers of and dealers in oils, paints, varnish and colours of all kinds. Nominal capital, £2,000 in £1 shares. A subscriber: H. F. Perry, 8, Park Grove Road, Leytonstone.

EVANS AND CO. (EALING), LTD., 261, Northfield Avenue, South Ealing, London, W.4. Wholesale, retail and manufacturing chemists and druggists. Nominal capital, £500 in £1 shares.

OCHILL MANUFACTURING CO., LTD., West Mills, Menstrie, Clackmannan. Manufacturers of and dealers in all kinds of oils, polishes and soaps; manufacturing chemists and druggists, etc. Nominal capital, £1,000 in £1 shares.

"RAPSIL" MARKETING CO., LTD. Dealers in paints or solutions for removing scales, fur, rust and other deposits from boiler plating and boiler tubes. Nominal capital, £1,000 in 1s. shares. Solicitors: Perowne and Co., 7, Great James Street, Bedford Row, London, W.C.1.

ROBERTS PETRIE AND CO., LTD., 2A, Cross Lane, Cannon Street, London, E.C.4. Importers, exporters, manufacturing and analytical chemists, etc. Nominal capital, £500 in £1 shares.

SHARDLOW CHEMICAL CO., LTD., 107, High Road, Beeston, Notts. Manufacturers of silicates, sodas, soaps, gums, glues, chemical manures and fertilisers; manufacturing chemists, etc., etc. Nominal capital, £5,000 in £1 shares.

WILKINSON AND LEECH, LTD., 28A, Manor Row, Bradford. Manufacturers of and dealers in paints, colours, varnishes, pigments, etc. Nominal capital, £1,000 in £1 shares.

Chemical Industry in Palestine

THE chemical industry is making steady progress in Palestine, says a report to the *Seifensieder Zeitung*. The Palestine Salt Co. will shortly commence running a plant at Athlit which will be able to produce about 50,000 tons of salt per annum. Salt is also now being obtained from the Dead Sea; so far this is being done in rather a primitive fashion, but the future possibilities are very great. The perfume industry is also being developed along strictly scientific lines. At Zichron-Jacob, in the vicinity of Haifa an excellently equipped research laboratory has been opened under the management of Mr. Kheifetz and will shortly commence work in earnest. A start has been made with the extraction of volatile oils from mimosa and eucalyptus. It is also intended to increase the lemon industry, for the production of citron oil, citric acid, and calcium citrate. So far there is no dye and colour industry in the country. German dyes being used exclusively by all the dyers. Plenty of raw materials are available for the development of the chemical industry; for instance, the Dead Sea supplies enormous quantities of kitchen salt and potash salts, whilst sulphur, asphalt, and phosphates are also available in Palestine; the only difficulty to be contended with at present is that of transport.